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THE SUGAR CANE:

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DEVOTED TO THE INTERESTS OF THE SUGAR CANE INDUSTRY.

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The British Refiners' Committee have received the following from Baron de Worms, M.P., in reply to their letter of December 23rd, 1887 (see page 19):—

Hotel Bristol, Paris,
24th December, 1887,

Dear Sir,

I beg to acknowledge your letter of the 23rd inst. It is most gratifying to my colleagues and myself to learn that your Committee, representing the great sugar refining industry of the country, consider the result of the first sittings of the conference as highly satisfactory, and are good enough to attribute the success, in a great measure, to the manner in which the British delegates conducted the negotiations.

From the very just spirit in which all our proposals were met by the foreign delegates, and, above all, from the unanimous adoption of the principle of the total abolition of sugar bounties, direct or indirect, we are, I think, entitled to auger favourably as to the practical result being attained on the resumption of the labours of the conference in April.

I am, dear sir,
Faithfully yours,
H. de Worms.

George Martineau, Esq.,
Hon. Sec. British Sugar Refiners' Committee,
London.

The imports, into New York, of Beet Sugar, from January 1st to December 14th, 1887, were only 52,491 tons against 115,550 tons in 1886.

The *New York Herald* of December 28th, says Reuter's Telegram, publishes advices from Hawaii stating that King Kalakaua continues to veto whatever Bills he pleases, relying upon the natives for support, which they give freely. The despatch adds that the natives are ready to fight, should the King give the word, and the country is in a dangerous state of unrest.

The following we copy from the *Greenock Telegraph*:—

"There are at present in Greenock seven refineries working' belonging to the following firms: Glebe Sugar Refining Co., John Walker & Co., Roxburgh-street Refining Co., Neill, Dempster, & Neill, Alex. Scott & Sons (Berryyards refinery), Orchard Sugar Refining Co., Cartsburn Sugar Refining Co. The refineries at present silent are six in number, belonging to the following firms: Clyde Sugar Refining Co., Alex. Scott & Sons (formerly Pattens' refinery), Glebe Sugar Refining Co. (Ingleston refinery), Alex. Scott & Sons (Baker-street refinery), Hogg, Wallace, & Co., and Ballantine & Rowan. In addition to the refineries turning out refined sugar, the glucose works of the Brewers' Sugar Co. have been in operation, and have been considerably increased in size during the year. The quantity of sugar refined in Greenock has been practically the same as last year, being in round numbers 240,000 tons. This is hardly up to the highest output of a few years ago; but it shows that the industry is still firmly holding its ground in spite of much discouragement and severe competition.

Viscount Gormonston, K.C.M.G. (Governor of the Leeward Islands), has been appointed Governor and Commander-in-Chief of the Colony of British Guiana, on the retirement of Sir H. Irving, K.C.M.G.

Lieutenant-Colonel (Governor of Fiji, and Her Majesty's High Commissioner for the Western Pacific) has been appointed Governor and Commander-in-Chief of the Leeward Islands.

Sir John Bates Thurston, K.C.M.G., Lieutenant-Governor of Fiji, to be Governor and Commander-in-Chief of that Colony.

Speaking of the sorghum sugar industry, the New York *Shipping List* says:—"A beginning having been made it will take a number of years to bring the sorghum sugar industry to a point where it will be in any sense an important competitor with either cane or beet sugar. Farmers will have to discover the profitableness of its cultivation, and be educated in the best and most economical method of culture, a corps of expert sugar makers will have to be trained, factories erected, machinery improved and adapted to obtaining the best results, and, in fact, the whole process of building up a new industry will have to be carried forward in progressive steps, before the successful experiment at Fort Scott becomes a practical reality in the industrial history of the country."

These things are all feasible, *provided Congress does not rescind the duty on sugar;* such action would be a severe blow to the infant industry. A bounty has been proposed, as an offset, but this plan will hardly carry enough votes to pass Congress.

The following supplementary list of the results of the working of German Sugar Companies for 1886-1887, is chiefly remarkable for the dividends which some of the Refineries are able to declare. The *Manufacturing* Companies show up rather badly.

Kujavien: shows a net gain of M.32,920, which permits a 3% dividend.

Tuczno: closed last year's campaign with a loss of M.69,635.

The *Brunonia* Refinery, Brunswick, pays a dividend of 9% on a capital of M.600,000, and places M.6000 to the reserve fund, in addition to the compulsory legal amount of M.4,060.

The *Halle* Refinery also pays a dividend of 9% on its capital of M.3,000,000.

The *Hildesheim* Refinery pays a dividend of 16%

The *Rheinische Aktienverein* (Manufactory) of Cologne pays 4% dividend on a share capital of M.6,000,000.

Melno (Manufactory) writes off all its profit, M.23,292.

Schwetz (Manufactory) shows a loss of M.96,081, which added to former losses makes the debit balance M.156,220.

Niederhone: shows a loss this year of M.12,850, and the balance on the debit side is now M.84,403.

The *Erste Schlesische Pilé Raffinerie* and the *Brunswick Aktienzuckerfabrik* both use their respective gains of M.73,925 and M.11,054 for reducing the large debit balanced against them.

The *Aktien-Zuckerraffinerie* of Dessau pays a dividend of 27½% on a capital of M.2,400,000, and carries M.7,628 to credit of new account.

Stuttgart Sugar Manufacturing Co. pays a 6% dividend on capital of M.1,320,000.

At the interview of the delegates of West India Committee with Baron de Worms, on the 8th ultimo, Mr. Daniel de Pass made a telling statement of the disastrous effect which the low price for sugar, brought about by the bounty system, had upon the sugar planters in Natal. He said, "On behalf of Natal, I, as a sugar "planter, can state that the sugar interest has languished, the small "planters are completely annihilated, and some twenty large estates, "costing some £30,000 each, are now abandoned through the price of "sugar being brought below the cost of production. I may add that "large sums of money have been spent in new machinery to improve "manufacture, and that the planters have at their own cost imported "the only reliable source of labour in the Colony. That they have "struggled for so many years, to be brought at last to the present "state of affairs, and that unless something be done for them shortly, "they will be compelled to shut up."

As many of our readers may not be aware of the extent of the sugar industry in Natal, we give an extract from a report published in 1885, bearing upon it:—

"There are at least 70 sugar planters in Victoria County alone, "with estates varying in acreage from 40 up to 1,100 acres, aggregating "20,000 acres. Many of the planters have mills, and the value of "the industry capitalized, in Victoria County alone, is not far short of "half-a-million sterling."

We may add that a large quantity (relatively) of sugar is grown in Alexandria, Durtan, and Tugela Counties, and during the last two years the larger planters have planted half as much again, to try to make up for the low price of sugar. Two years ago £26 to £28 was obtained locally, without difficulty, for Yellow Crystals, which are now selling at £16.

More money has probably been sunk in sugar machinery and plant in Natal in proportion to the output, than in any other Colony Three of the largest mills have cost about £150,000, £85,000, and £50,000 respectively.

1887.

Bright as are now the prospects of the sugar trade, the record for 1887 is but a sorry one. If we take the first nine months, we find that the average price of sugar was lower than has ever been known. The average price for 1886 of 88% German beet sugar was 11/10½, and this was 2s. per cwt. below that for 1884 and 1885, but from January to September, 1887, the average was 11/8. The following tables, showing the averages for each quarter of the past six years speak for themselves:—

BEET 88%.

	1882.	1883.	1884.	1885.	1886.	1887.
First Quarter	21/6	20/-	17/1	11/5	13/7½	10/10
Second ,,	22/9	21/3	14/7¾	14/6	12/1½	11/8½
Third ,,	22/3	20/7	13/6	15/2	11/1½	12/7
Fourth ,,	20/3	18/9	10/6½	14/9½	10/9	13/7
Average for the whole Year	21/8	20/1½	13/11	13/11½	11/10½	12/2

For the sake of comparison we give the figures for the same periods for good brown West India and Java:—

WEST INDIA.

	1882.	1883.	1884.	1885.	1886.	1887.
First Quarter	21/1	19/10	16/7	11/4	13/6	10/8
Second ,,	21/10	21/2	14/–	14/10	12/3	11/–
Third ,,	21/6	20/2	11/4	14/10	11/4	12/–
Fourth ,,	20/8	10/–	11/2	14/11	11/3	13/7
Average for the whole year	21/3	20/–	13/3¼	13/11¾	12/1	11/9

JAVA 14 D. S.

	1882.	1883.	1884.	1885.	1886.	1887.
First Quarter	25/5	24/–	20/8	14/7	15/4	13/2
Second ,,	25/10	24/7	18/3	17/6	14/3	13/7
Third ,,	25/7	24/1	15/8	17/1	13/3	13/10
Fourth ,,	24/6	22/10	14/8	17/7	13/5	15/9
Average for the whole Year	25/4	23/10½	12/3¾	16/8¼	14/0¾	14/1

The price of beet sugar regulates the price of all other sugars—12s. per cwt. has been the average for 1886 and 1887. How many planters are there, who at this price, can have held their own?—we fear but very few. In the majority of cases, their losses cannot be less than 2s. per cwt. The recent important advance of 4s. per cwt. in the price of sugar will do something towards reviving their drooping spirits, for great as the advance has been, there is every probability that it will not only be maintained, but that we shall see higher, and, possibly, *much* higher prices during the next six or nine months.

At the present price, say 16s. per cwt., the Germans can produce sugar at a good profit, even without any bounty; we must therefore look for a large increase in the sewings in the coming season, with the result of an enormous crop for 1888-89, with prices down to 15s. a year hence. Planters will do well to get their crops to market as quickly as possible, and realize, whilst these comparatively high prices continue.

The great increase in the consumption of sugar, to which its low price has so largely contributed, will now receive a check, unless the United States reduces its tariff for sugar to one half its present rate, which would doubtless give an important impetus to the consumption in that country. In the face however, of the strong protectionist feeling which exists in the United States, it is quite open to question whether such a reduction will be effected during the present year.

We shall probably find, as a result of the recent advance, that the cane sugar supplies of the present year will greatly exceed present calculations Last year, in Cuba, a large number of planters did not grind their canes,—the wretched prices then ruling for sugar, not making it worth their while. The production in Cuba, from the changed condition of the market, will probably be increased by 50,000 to 100,000 tons.

The "diffusion process" as applied to sugar cane, though not as yet a proved success, has made some headway during the year. Mr. Quintin Hogg has had it applied on his *Nonpareil* estate in Demerara, but owing to the faulty construction of the cutters the trial was a failure. Some important facts were established, which we take from Mr. Hogg's address on the subject, which we printed in the August *Sugar Cane*, page 397. He says:—"Our trial was, "I considered, so far satisfactory, that it showed us that in spite "of very adverse conditions, diffusion gives us almost the exact "increase over mill returns, as I had calculated as probable from "what I had seen at Aska. It showed us also that the battery "could be manipulated by our own people without difficulty;

"and finally it laid altogether one bugbear, which had been "prominently brought forward by advocates of the mill. I "refer to the disposal of the chips. This was really a serious "matter, for at *Nonpareil*, when in full work, we should have to deal "with two tons of chips every eight minutes, and Mr. Kollmann warned "me at Aska that this was by far the most serious difficulty "with which planters have to contend. * * * To our great "relief we found that our mill, the trash turner of which had been "slightly raised, took our chips readily, and re-delivered them to us "containing only 55 per cent. moisture, and therefore in a state to "form excellent fuel. They were thrown into our green begasse "furnaces, and as soon as they were got warm burnt readily. Mr. "L. Jones is of opinion that we may safely count upon this difficulty "having been overcome, though it is possible that some slight "modification in the arrangement of the furnace bars, may be "advisable."

If we are to believe reports, the United States mean to produce their own sugar; and in order to have two strings to their bow, they are going in for manufacturing beet sugar, as well as sorghum sugar. Claus Spreckels (the California "Sugar King"—who is said to "control" Hawaiian sugars, which, though they pay no duty, are dearer in San Francisco than similar sugars are in New York, which have paid a duty of 10s. per cwt.)—has recently paid a visit to European beet countries, in order, it is said, to satisfy himself as to the feasibility of producing beet sugar in California. He has returned full of hope and confidence, and he intends, it is stated, forthwith to commence operations on a grand scale. Enthusiastic meetings of farmers in California have been held, who have promised any amount of sugar beet.

Claus Speckels, by the free admission of Hawaiian sugars, must net an *enormous* income. Everything now points to an early great reduction in the tariff on sugar, and for every cent taken off in duty, means so much less gain to him; if by getting up a beet sugar fever, he can influence Congress in keeping the duties on sugar as they are, he will not mind spending 1 or 200,000 dollars in getting up this agitation.

It is about 17 years since the Beet Sugar Factory at Alvarado (about 17 miles south of Oakland, California,) was started for the purpose of demonstrating that beet sugar can be profitably produced in the States. The company has had a chequered career. Since 1884, that is, from the time low prices set in, it has paid no dividend. We hear that the property has recently been purchased by the Pacific Coast Sugar Company for £25,000. It is proposed to spend £15,000 in re-building the factory, and making it first class in every particular. Its capacity, it is stated, will be 2000 to 2500 tons sugar in the season, and it is confidently believed that sugar can be produced at a cost *not exceeding* 4½ cents per lb. (21s. per cwt.), which with the selling price, 5½ cents per lb. (25s. 8d. per cwt.) will admit of a dividend of 20 per cent. on the £40,000. The promoters seem to ignore the possibility, not to say probability, of an early reduction in the tariff, which would at once convert their imaginary profit into a real loss.

Perhaps the most important event in connection with the Sugar Trade in 1887 has been the assembling of an International Congress in London, having for its object the suppression of bounties. The decisions come to, and especially those contained in the scheme adopted by it (see page 14) are not of course final; still they are of great value. After a few sittings the delegates of eleven different countries, who were all provided with the instructions of their Governments, have come to a complete understanding on several very important and fundamental principles.

The delegates will lay before their Governments the scheme for an agreement, in the first article of which is recognized the pledge to put an end absolutely, once for all, by legislative regulations, to the granting of open or disguised bounties. The taxation of sugar coming into consumption alone, is regarded as the only means of fulfilling this pledge. Belgium only is unwilling to adopt this system; against this placing themselves in an exceptional position, the French representative protested, and those of Germany, Austria, Holland, Russia, Spain and Italy concurred in the protest. The respective Governments are requested to notify to our Government by the first of March whether they accept the fundamental principles of this scheme, and in the affirmative, to state in what measure they propose to apply the taxation on the sugar obtained and coming into consumption.

It is a great step to have got so far; and having got so far, there is ground for hope, that when the Congress meets next on 5th April, further steps will be taken to give legislative effect to the conclusions arrived at.

OBSERVATIONS ON THE ANALYSIS OF WATERS.

By Dr. T. L. Phipson, F.C.S., Lond., &c.,

Member of the Society of Chemical Industry.

During the years 1878 and 1879 the chemical journals contained some notes on the results of analysis of waters made in my Laboratory, in London, for some years previously. Since that time a very considerable number of waters from various localities in Great Britain, and in some instances from foreign Governments, have passed through my hands, and the labour that has been devoted to them has brought many interesting facts to light.

From a sanitary and an industrial point of view, there is no subject of more vital importance to mankind than that of the water used for domestic purposes and in the various arts and manufactures. We may put aside here the question of *mineral waters*, used only as medicaments, as we are dealing with a matter of far greater interest.* It has been proved that at least two diseases, typhoid fever and cholera, are transmitted by impure water used for drinking; but it is highly probable that a considerable number of other ailments, scarcely less severe, and among them intermittent and remittent fevers, can be traced to the same source. Half the diseases which afflict the homes of residents in the country (especially as regards children) may be attributed to the same cause, and I have been obliged to condemn, as unfit for use, about one-third of the waters used for drinking that have reached me from such places.

In most instances, the well which supplies the house has been made far too near the drainage pipes, with the inevitable consequence that, as years roll on, leakage occurs at some point or other, and the water becomes impregnated with sewage.

This is a state of things that requires immediate attention in many a fair English home. I have sometimes found that even a shallow well, far from the house, near the stables, the water of which was used for the horses and for washing the carriages, gave much better results to analysis than the well near the house which supplied the family; whilst all the animals had a fine healthy appearance, with sleek and glossy coats, the blotched faces and unhealthy appearance of the inmates of the house clearly indicated the habitual use of impure water.

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* It may be noted, however, that nothing can be more dangerous to invalids than to drink artificial mineral waters that happen to be made with impure or contaminated water.

Nothing, again, can be more dangerous to a community than the use of impure water for bread-making, or for certain kinds of pastry, &c., where the heat employed is not sufficiently high or prolonged to destroy the germs of disease which may be present; and the water used in sugar refineries and all other industries dealing with articles of food, should, of course, be perfectly pure.

Unfortunately the various processes of water-analysis described in the most modern works are, with few exceptions, very defective, uncertain, tedious to carry out, and expensive to those who desire to avail themselves of the services of the analytical chemist. I shall not trouble my readers by referring to them in detail, for these elaborate lucubrations are of very little practical value.

Whether a well water which supplies a house or a manufactory is liable to become contaminated at some more or less remote period, and thereby affect the health of the proprietor, or the plates of his boilers, may be left for the consideration of the engineer and the architect who know the dispositions of the building and the distance and direction of the drainage pipes. Whether a water is, or is not, contaminated by infiltration of sewage is the question for the analytical chemist to solve. In order to facilitate matters in this respect, I will call attention to a few points of special importance.

TASTE AND ODOUR.—It is always suspicious if a water used for drinking presents any taste or odour. It should be tasteless and odourless. There are, however, cases in which waters have a *very slight* taste, and some amount of earthy or peaty odour, and are nevertheless perfectly good. But a distinctly saline, or *saline* and *bitter taste*, and a more or less offensive *ammoniacal odour* are the worst signs possible.

PHOSPHORIC ACID.—In no pure waters is phosphoric acid present in more than the most minute amount, generally *mere traces*. In contaminated water phosphoric acid is always present, and may be detected and estimated by a new process which I have lately proposed, and which consists in adding to about a pint of the water a small quantity of solution of pure potash alum, and then a drop or two of ammonia. The precipitate which results is treated with dilute acetic acid, which leaves the *phosphate of alumina*, and this is afterwards dissolved in nitric acid and at once tested by the ordinary molybdate process.*

UREA.—Urea, like phosphoric acid, is conveyed to water by sewage or drainage. I have shown formerly how it can be detected in the waters of some of the Dutch canals. The residue left on evaporation over a water-bath is treated with absolute alcohol, and the alcoholic extract with a drop of nitric acid which gives a fine crystallisation of *nitrate of urea*, very conspicuous under a weak magnifying power. If larger quantities are operated on, the amount of urea present may be determined by the hypobromite process; but this is of less consequence.

RESIDUE.—The residue, or "total solids," left by the evaporation of about a quart of water at 100°C, is determined with accuracy in grains per imperial gallon. It consists of the mineral matter contained in the water, the organic matter, and the combined (or solid) water united to the mineral matter. After it is weighed it must be calcined in a platinum crucible, and the odour produced on combustion of the organic matter duly noted. If it gives out a pleasant, aromatic or peaty odour, it is probably of a harmless nature; but if it gives a nauseous odour, like that of burning feathers, it may be considered a bad sign.

CHLORIDES.—A large amount of chlorides in spring waters is also, generally speaking, a bad sign, and demands that the water should be most carefully scrutinised.

AMMONIA.—The only way of estimating ammonia in spring waters with perfect accuracy is due to Boussingault. It consists in submitting a quart of the water to distillation after addition of a little calcined potash: about half a pint of the distillate is collected, and the ammonia determined by standard acid. The "Nessler test," like all other colour tests, is uncertain and unsatisfactory. The presence of free ammonia, or ammoniacal salts, in a specimen of water is one of the worst signs.

BACTERIA.—It is useless to take note only of the forms and numbers of bacteria and micrococci: waters which are good often abound with microbes of a harmless nature. The nature of a noxious microbe can only be ascertained by inoculation.

Where impure water alone is available, unless it be very bad it may be used after boiling, aërating, and filtering through a block of charcoal. Very pure waters are liable to attack lead cisterns and dissolve the metal; they should be stored in limestone or slate cisterns. Lead cisterns should be frequently emptied and thus kept clean, but never rubbed to remove the coating left by the water, and so lay bare the metal.

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* PHIPSON.—*Determination of Phosphoric Acid in Contaminated Waters.* Dec., 1887.

In impure waters used for supplying boilers, the amount of lime present should be ascertained, and the *exact quantity* of carbonate of soda necessary to precipitate two-thirds of this amount should be added; the water is then allowed to deposit and the boiler fed from the clear liquid run off; or it may be filtered where such an operation is practical.

Putney, London, S.W.,
10th December, 1887.

SIR HENRY ROSCOE, M.P., ON SACCHARINE.

The following letter has a special interest at the present time:—

SIR HENRY E. ROSCOE, F.R.S., M.P., to Royal Gardens, Kew

10, Branham Gardens, Witherby Road, S.W.,
3rd December, 1887.

My dear Sir,

In reply to yours of November 28th, as to the probable influence of the discovery of saccharine on the growers and makers of sugar cane and cane sugar, I have to say, that, I do not believe that saccharine is ever likely to become an article of common use like sugar. In the first place, saccharine is not a food, whilst sugar is; and in the second place, I doubt whether saccharine can be prepared at a priec likely to compete with sugar.

I think that this artificial sweetening agent will, however, become a useful material in cases in which sugar cannot be employed, as in diabetes and other diseases.

It seems to me beyond the bounds of possibility, that the price, or production of cane sugar, can be materially affected by the introduction of saccharine.

I am, yours truly,
(Signed) HENRY E. ROSCOE.

D. MORRIS, Esq.

THE INTERNATIONAL CONFERENCE ON THE SUGAR BOUNTIES.

PROPOSED CONVENTION.

The members of the International Conference on Sugar Bounties met on December 19, 1887, at the Foreign Office for the last time before adjourning. Baron Henry de Worms presided, and all the representatives attended. The sitting occupied over three hours, and on rising the Conference adjourned to April 5th.

The following letter was read to the members of the Conference by Baron Henry de Worms:—

"Foreign Office, December 17.

"My dear Baron de Worms,—A political engagement of long standing will take me away from London, and will, to my great regret, prevent me from having the opportunity of meeting the delegates to the Sugar Conference at their final sitting. Will you kindly be the bearer of my apologies and, at the same time, of my sincere congratulation on the success which has attended their labours? The present suspension of their labours is only an adjournment. I shall hope to have the honour of welcoming them on their reassembling in March, when I trust they will return armed with the powers necessary to give practical effect to their valuable deliberations.

"Believe me, yours very truly,

"SALISBURY.

"To the Baron Henry de Worms, M.P."

The following Protocol was signed on December 19, 1887, by the Delegates of the various States represented at the Conference:—

"The undersigned Delegates of Germany, Austria-Hungary, Belgium, Denmark, Spain, France, Great Britain, Italy, the Netherlands, Russia, and Sweden met in London on the 24th of November, 1887, in order to study the bases of an understanding with regard to the suppression of bounties on the exportation of sugars. After the deliberations recorded in the *procès verbaux* of the sittings, they arrived at an agreement upon the principles enunciated in the report of the Commission. In order to give a practical application to this enunciation, the President of the Conference communicated to them a proposal of convention, which they have examined and undertake to submit to the consideration of their Governments, praying them to make known to her Britannic Majesty before the 1st March, if they adhere to the principles of this proposed convention which is annexed to the present Protocol. In case of agreement each Government shall communicate with the British Government before the said date a proposal indicating the bases of the application of the system of taxing the quantities of sugar produced. This proposal is to state with what limitations and in what cases saccharimetry will be employed. Each Government will at the same time make known if, for the sake of uniformity it may be disposed to admit what is called the French method generally employed in the commerce of several nations. With regard to Article III. of the said proposed convention, the French Delegates, not considering that the system proposed by Belgium presents for the suppression of bounties the guarantees with which the high contracting parties ought to be furnished, make the most express reserves as to this article. The Delegates of Germany, Austria-Hungary, Spain, Italy, the Netherlands, and Russia, adhere to the reserves made by the French Delegates.

"Done at London, 19th December, 1887."

The following is the annexe to the above Protocol:—

The high contracting parties desiring to ensure the total suppression of premiums, open or disguised, on the export of sugars, have resolved to conclude a convention to this effect, and have appointed as their Plenipotentiaries the following:——— who, after having exhibited their full powers, found to be in good and due form, have agreed upon the following articles:—

"1. The high contracting parties undertake to take, or to propose to their respective Legislatures, measures which shall constitute an absolute and complete guarantee that there shall not be granted any premium open or disguised on the export of sugars.

"2. The high contracting parties undertake to adopt, or to propose to their respective Legislatures, a system of taxation of the quantities of sugar produced, and destined for consumption, as the only plan which permits of the suppression of the premiums in question, and to submit to the same arrangement the factories of glucose and factories for the extraction of sugar from molasses.

"3. Belgium not being under the same conditions with regard to the application of the system of taxing the quantities of sugar produced, the system at present in force in that kingdom may be maintained with the following modifications:—The assessment of the tax shall be reduced from 45fr. to 25fr., from the time the present Convention shall be put in force. The capacities of the compounding factories shall be increased from 1,500 to 1,700 grammes.

"4. States, or colonies and possessions not among the high contracting parties, who, though not adopting the system mentioned in Article 2, do not levy taxes on sugars, or who agree not to allow upon raw or refined sugars which are being exported, any drawback, reimbursement, or reduction of charge of dues or quantities, shall also be admitted to the Convention.

"5. In case a State which does not levy duties on sugar shall impose them, this State must levy those duties upon the quantities of sugar produced and intended for consumption, or at least must not give any drawback, reimbursement, or discharge of duties or quantities.

"6. The high contracting parties shall communicate the laws which may have been already adopted, or which are about to be enacted in their respective States with reference to the object of the present Convention.

"7. States which have not taken part in the present Convention are admitted to adhere to it on their demand. This adhesion shall be notified in diplomatic course to the Government of her Britannic Majesty, and by them to other contracting Powers.

"8. The stipulations of the present Convention shall be applicable to the Colonies and possessions of her Britannic Majesty with the exception of those here named, that is to say:—The East Indies, Canada, Newfoundland, the Cape, Natal, New South Wales, Victoria, Queensland, Tasmania, South Australia, Western Australia, and New Zealand. In any case the stipulations of the present Convention shall be applicable to any of the colonies above indicated from the time when the British Government shall notify the adhesion of that colony or possession to the other contracting Powers. Each of the colonies or possessions above named which may have adhered to the present Convention preserves the power of retiring in the same manner as the contracting Powers. In case one of the colonies or possessions alluded to should desire to withdraw from the Convention, a notification to this effect shall be given by the British Government to the other contracting parties.

"9. The present Convention shall be put in force from ———. It shall remain in force for 10 years from that day, and in case none of the high contracting parties shall have notified 12 months before the expiration of the said period of 10 years its intention to put an end to it, it shall continue in force for a year, and thus from year to year. In case one of the Signatory Powers shall denounce the Convention, this denunciation shall have no effect save with respect to that Power.

"10. The present Convention shall be ratified, and the ratifications shall be exchanged in London within ——— months or sooner, if possible."

At the conclusion of this seventh sitting of the Congress, Baron DE WORMS addressed his colleagues as follows:—

"Dans quelques moments nous allons nous séparer. Nous sommes arrivés à un moment d'arrêt dans nos travaux.

"Les divers États nous avaient donné mandat de discuter la suppression des primes sur le sucre. La mission n'était pas sans difficultés. On cherche une solution de cette question depuis vingt-sept ans. Nous avons tous eu des intérêts divers, quelquefois divergents, à ménager; mais il a été bientôt manifeste que nous visions tous le même but, et l'unanimité n'a pas tardé à se produire. C'est ainsi que nous avons préparé un projet de Convention qui résume les décisions que nous avons prises et les recommandations que la Commission nous a faites. Nous pouvons hardiment le soumettre à l'approbation de nos Gouvernements. J'a la confiance qu'il sera accepté. Nous saurons, dans ce cas, que nous avons contribué à un grand acte de justice à l'égard du commerce international, acte qui ne manquera pas de fortifier les bonnes relations que ce commerce établit entre les peuples.

"Notre œuvre peut laisser subsister quelques lacunes, mais elle pose les véritables principes de l'union que nous voulons former. Permettez-moi, en ma qualité de Président de cette Conférence, de faire quelques observations sur ce qui me paraît être la vraie portée du projet que nous allons soumettre à nos Gouvernements. Tout en se préoccupant de l'uniformité, il ne formule aucun projet de loi, ou de règlement, qui doive être adopté par tous les États. Mais il affirme les seuls principes qui puissent assurer l'uniformité des résultats. Je crois qu'on ne saurait atteindre cette uniformité de résultats par la voie de l'uniformité de législation. L'esprit des lois et des règlements diffère d'un pays à l'autre. Les mœurs administratives ne diffèrent

pas moins. Je vous avouerai qu'il est incontestable pour moi que les caractères de la fraude sont loin d'être les mêmes partout.

"Il est des pays où l'Administration fera tous ses efforts pour prévenir un procédé frauduleux qui sera presque inconnu dans un autre pays. Ici on ne déjouera les tentatives de fraude que par telle ou telle disposition qui serait inutile ailleurs. Je conçois, même que l'uniformité de législation pourrait bien ne pas assurer les résultats que nous désirons obtenir, notamment la cessation de la prime.

"Nous laissons à chaque pays la responsabilité de déterminer, selon les besoins de ses industriels et selon ses habitudes administratives, quelles sont les dispositions législatives qui assurer ont le fonctionnement régulier des systèmes d'impôts que décrètera la Convention.

"Cette responsabilité individuelle de chaque État est la meilleure de toutes les garanties. Tous les Gouvernements ont rèsolu, soyons-en convaincus, de faire disparaître la prime ; ils le dèsirent sincèrement. Voilà la vraie base de l'Union.

"La loi que le Gouvernement de chaque État formulera devra établir nettement que la prime cessera désormais d'exister chez-lui. Il incombe à chaque Gouvernement d'agir comme si la réalisation du désir commun dépendait de lui seul; il faut que les dispositions de chacune des lois soient d'une efficacité si complète et si évidente que les autres Gouvernements n'aient aucune difficulté à y trouver toutes les garanties qu'ils ont le droit de demander, et sans lesquelles ils ne voudraient pas, de leur côté, faire partie de l'Union.

"Il me reste, mes chers collègues, à vous remercier, en mon nom personnel; la bienveillance cordiale que vous n'avez cessé de me témoigner a rendu bien facile la tâche de présider à vos délibérations. Je vous en dois une profonde gratitude. Je n'ai aujourd'hui qu'un regret, c'est que nous soyons contraints de suspendre pour un temps nos Conférences. Cette interruption même marque combien sont grands les progrès que nous déjà avons fait.

"Si nous nous séparons, ce n'est que pour préparer les lois qui donneront un corps au Project de Convention que nous venons de rédiger.

"Je dois aussi exprimer à M. Boizard les meilleurs remercîments de la Conférence, et tout particulièrement ceux du Foreign Office, pour la gracieuse obligeance avec laquelle il s'est mis à notre disposition pour la rédaction des procès-verbaux. Son concours nous a été précieux."

The Comte de Kuefstein (Austrian representative) replied as follows :—

"Après le discours de M. le Président, je n'oserais certainement plus prendre la parole s'il ne s'agissait pas d'un devoir impérieux á remplir en lui offrant nos plus chaleureux remercîments pour la manière courtoise dont il a dirigé les travaux, et pour la grande obligeance qu'il n'a cessé d'apporter dans ses relations avec nous. C'est un devoir du cœur que je suis heureux de pouvoir remplir.

"Quand nous nous sommes réunis ici pour répondre à l'invitation du Gouvernement de Sa Majesté Britannique, on pouvait prévoir de nombreuses difficultés. Aujourd'hui nous nous séparons après avoir trouvé les éléments d'un accord général.

"Si dans nos pays respectifs on approuve ce que nous venons de faire, nous aurons la satisfaction d'avoir contribué au rapprochement des nations représentées ici, relativement à une des questions les plus délicates. Nous le devons certainement à l'esprit de conciliation dont chacun de nous s'est inspire, mais nous le devons aussi, et surtout, à la direction habile et éclairée de notre très honoré Président, grâce à laquelle nous avons obtenu un résultat qui peut avoir de très heureuses conséquences.

"Je dois donc être l'interprète des sentiments de tous mes collègues en lui exprimant nos plus chaleureux remercîments, et je suis également sûr de l'approbation générale en étendant nos remercîments à tous les membres de la Délégation de la Grande-Bretagne, qui nous ont donné des témoignages continuels d'obligeance et de sympathie.

"Et, the last, but not the least, nous désirons dire à MM. les Secrétaires de la Conférence, auxquels M. Boizard a bien voulu se faire adjoindre, combien nous leur sommes reconnaissants de l'habileté et de la patience avec laquelle ils ont reproduit nos paroles et rédigé les Procés-verbaux de nos discussions."

M. Sans-Leroy exprime, à son tour, à M. de Kuefstain les remercîments de la Conférence.

M. le Président propose de fixer la date de la prochaine séance, qui ouvrira la deuxième session, au Jeudi, 5 Avril prochain.

Cette date est adoptée sans observation.

Le procès-verbal de la séance actuelle est lu et adopté.

La séance est levée à 6 heures.

Le Président de la Conférence,
Henry De Worms.
Les Secrétaires,
H. Farnall,
A. E. Bateman,
E. Boizard.

The following letters, congratulating the British delegates upon the successful conclusion of the first portion of the labours, have passed between the Sugar Refiners' Committee and Baron de Worms:—

THE BARON HENRY DE WORMS, M.P., &c., &c.

Sir,

I am desired to express to you and your colleagues, the British Delegates at the International Conference on sugar bounties, the hearty congratulations of the sugar refiners at the successful conclusion of the first portion of your labours, and their warm thanks for the ability and tact with which the negotiations have been conducted.

Your own success in avoiding or overcoming difficulties, well seconded, no doubt, by Mr. Kennedy's sound diplomatic judgment, is clearly apparent; and we are sure that Mr. Walpole's mastery of technical details has already been of great service, and will, during the future course of the negotiations, be highly conducive to their success.

Former acquaintance with similar negotiations leads us to view without surprise, though with great regret, the persistence of Belgium in a course which we cannot regard as otherwise than highly unreasonable. The only way out of the difficulty appears to be the abolition of the duty in Belgium, which only yields the insignificant amount of six million francs. We have reason to believe that this would meet, in Belgium, with the approval of all branches of the trade.

Apart from that point of difficulty, you have succeeded in skilfully conciliating divergent interests, and in securing uniformity of principle while avoiding the impracticable and unnecessary accompaniment of uniformity of legislation.

Again thanking you for your able conduct of the negotiations, and with the sincere hope that future difficulties will be successfully surmounted,

I beg to remain, Sir,
Your obedient servant,
GEORGE MARTINEAU,
Hon. Sec., British Sugar Refiners' Committee.

21, Mincing Lane, 23rd December, 1887.

For Baron de Worms' reply to the foregoing letter, see page 1.

CORRESPONDENCE ON THE SUGAR BOUNTIES.

LETTERS TO *The Times* FROM MR. LEVESON-GOWER, SIR LOUIS MALLET, MR. JAMES DUNCAN, MR. G. BADEN-POWELL, M.P., AND MR. NEVILE LUBBOCK.

To the Editor of "The Times."

Sir,—The action of the Government with regard to the sugar bounties appears to me so objectionable that I will ask you to be good enough to let me refer to it in your columns.

Foreign Governments, by granting these bounties, provide us with sugar at a less cost and more abundantly than we could otherwise obtain it. This is a considerable boon, particularly to the working classes, as sugar is an article of universal consumption. How senseless it is in us to ask those foreign Governments to withdraw this boon from us. If they do so the effect will be exactly the same as if we imposed a duty upon foreign sugar. It is the old protectionist policy, which favoured certain industries at the expense of the public. It is the policy upon which is founded the system of bounties, which are objectionable, but only injure the countries where they are given. In both cases, in order to favour certain producers, money is taken out of the pockets of the people, in one case by means of taxation, in the other by the enhanced price they have to pay for what they consume.

The plea that protection promotes native industry generally is unfounded. What it does is to assist the industry it protects at the expense of other industries. It favours the direct producer to the detriment of the indirect producers, of those who produce the commodities which are exchanged for foreign productions. Take, for instance, this case of sugar. If, owing to the cessation of bounties, less is imported, the producers of the exports which are now exchanged for it would incur losses at least equivalent to the gains of our producers of sugar. Native industry would at least lose as much as it would gain. Moreover, people having more to pay for their sugar would have less to spend on other commodities, to the injury of trade. I apologise for urging these elementary truths, but I do so as they seem completely ignored in high quarters.

With regard to the plea of unfair competition, I would ask in what way, if it is advantageous to let in foreign commodities free, that advantage depends upon the circumstances under which those commodities were produced. This plea used frequently to be urged by the protectionists. Before the repeal of the Corn Laws many farmers declared that they would not object to it if their foreign competitors were as heavily taxed as they were. When the repeal of the paper duties was proposed the paper-makers objected to it because in some other countries an export duty upon rags was imposed, which gave their foreign competitors an advantage over them. I remember an owner of a large paper mill telling me at the time that, with regard to free trade, I need not mistrust him, as he had taken an active part in the agitation against the Corn Laws, but that this question of rags made paper an exception to free trade. But the country turned a deaf ear to such pleas, and corn and paper have been since admitted free, to the incalculable advantage of the country.

My apology for the length of this letter is the importance of the question it but too feebly touches upon. The Tory party, after having had to acquiesce in free trade for many years, has now declared itself protectionist, and the Tory leaders, although they still say they are free-traders, a homage protection pays to free trade, are evidently sitting on a rail with regard to it. Their utterances are not reassuring, and if they now tax our sugar they will soon attempt to tax our bread. If the free-trade patrons of our Government can avert these evils they will confer a great service on their country.

Your obedient servant,

F. LEVESON-GOWER.

Holmbury, Dec. 3.

TO THE EDITOR OF "THE TIMES."

Sir,—As a free trader, I have read Mr. F. Leveson-Gower's letter in *The Times* of the 10th inst. with some surprise.

He appears to think that bounties upon foreign exports to this country, which, he admits, are injurious to the countries which grant them, are nevertheless beneficial to us.

Now I have always understood it to be a cardinal doctrine of the free trade policy that it was reciprocally advantageous to the countries which exchange their products, and I am at a loss to comprehend how a system which injures our customers can be favourable to ourselves.

The ideal policy, from a free trade point of view, would be, I presume, that there should be absolute freedom of exchange between two or more countries trading with each other, without either bounties or any other form of protection on either side.

Does Mr. Leveson Gower mean to say that he would prefer to such a policy, in the interest of England, a system under which, while this country maintained absolute freedom both of imports and exports, other countries should grant bounties upon their principal exports to us?

If this be his meaning I would ask him another question. What is free trade? Is it not a system under which every industry in every country is left free to select the most profitable field of employment, without any kind of interference by Governments, either in the way of subsidy or restriction; and is it not the justification of this policy that it is assumed to be that which will yield the largest return to human effort—that is, the greatest sum of the products of industry at the least cost?

If this be so, how can such a policy be fulfilled if capital and labour are artificially and arbitrarily diverted, by the action of Governments, from the more to the less profitable employment?

If Mr. Leveson-Gower will extend his inquiry from the particular case of sugar to the whole range of foreign productions exported to England, I think he will find that the effect of bounties on foreign sugar, so far from cheapening their cost as a whole, tends rather to raise them at the expense of the British consumer, to diminish the consuming power of the countries which grant them, and to restrict the whole field of international exchange.

On Mr. Leveson-Gower's principle it might equally be argued, on a superficial view, that the maintenance of protective duties on imports by foreign Governments is beneficial to English interests. Their immediate effect is to restrict the demand for English products, and thus to lower their prices. "How senseless," then (to use Mr. Leveson-Gower's words), to ask foreign Governments to withdraw from us that which cheapens the cost of those products to the British consumer!

The truth is that the complete fulfilment of the free trade policy is no less impossible under a system of bounties than under any other form or mode of protection.

With regard to Mr. Leveson-Gower's statement that the effect of the abolition of foreign bounties on sugar would be the same as that of the imposition of an import duty on such sugar (we are both, of course, speaking of refined sugar), I will only observe that the first measure would leave each country free to employ its industry in the most economical manner, while the latter would give an artificial protection to a particular British industry, thereby diverting trade from its natural channel.

In blaming the present Government for convoking the Sugar Bounty Conference, Mr. F. Leveson-Gower seems to have forgotten that conferences, with a similar object in view, were held on several former occasions when Mr. Gladstone was in office—the first when Mr. Milner Gibson, of all men, was President of the Board of Trade. I am not aware that the Governments of the day were ever considered on that account to have compromised their free trade principles.

I have the honour to be, Sir,
Your obedient servant,
LOUIS MALLET.

Englefield Green, December 10th.

TO THE EDITOR OF "THE TIMES."

Sir,—Mr. Leveson-Gower, in his letter to-day,* condemns the action of Liberal and Conservative Governments, and in doing so he has evidently forgotten the fact that both political parties have objected to bounties on principle and endeavoured for many years past to obtain their suppression. Why is wheat so cheap, and why is the price of it so difficult to raise? The answer is because the area of production is so vast. Curtail this area and, with bad harvests intervening, the price would rise. So with bounty-fed sugar. The area is curtailed, and supply is largely dependent upon particular sources, a partial failure of which, such as a short crop in Germany, raises the price at once, even to the extent of 50 per cent. Thus in 1884 beet 88 per cent. fell to 10s. per cwt. Now it is 15s. 6d., with every prospect of a further advance. If the sugar area were larger, and the production governed by purely natural conditions, no such fluctuations would be possible. Sugar machinery and skill are always improving, and the cost of production becomes proportionately less. But do bounties in some countries encourage the application of capital and skill in other countries where no such artificial aid exists? Certainly not, for the effect of bounties is to create uncertainty, and, indeed, to paralyze all natural industry.

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* Though dated December 3rd, not inserted until December 10th.

Abolish bounties, introduce free trade in sugar and the interests of the consumer, for which Mr. Leveson-Gower is so anxious, would be best promoted. As a sugar refiner I naturally desire low prices for my raw material, but I have found it impossible to compete with State-aided sugar.

If Mr. Leveson-Gower is right in his argument, our railway companies would be justified in their preferential rates for foreign produce. Does the voice of the country approve this? An analogous advantage is given to foreign beet sugar so long as the bounty it receives is not removed, and such removal would be the very opposite of protection, containing within itself indeed the very essence of free trade. The announcement in *The Times* yesterday of the treaty between Austria and Germany is very hopeful, and I have no hesitation in predicting that when bounties are swept away, and an unlimited production obtained wherever natural conditions are favourable, the consumer will be benefited by a permanent cheapness in this article of food. We have to thank the present Government for the efforts they are making, which must sooner or later receive the warmest approval of the country.

Your obedient servant,

JAMES DUNCAN,

Chairman of the British Sugar Refiners'
Association.

London, Dec. 10th.

TO THE EDITOR OF "THE TIMES."

Sir,—Sir Louis Mallet's admirable letter to you has cleared up one aspect of the question, but I have been much questioned of late on two other points in connection with the present Sugar Bounties Conference.

I am asked—Why should States which give bounties wish to put an end to the system? and, secondly, What can this conference do to put an end to the system? I trust it may be convenient and useful if I summarize the main replies to these two queries.

In the first place, States which give bounties suffer the following, among other, evil consequences:—(1) The price of refined sugar to the local consumer is greatly increased, sometimes by as much as 200 or 250 per cent.; (2) the price of raw sugar to the local refiner or manufacturer (who uses sugar) is greatly raised, while the price is lowered to his foreign competitor; (3) the taxpayer is forced to contribute millions sterling to make up the losses, or at best swell the profits, of a small class; (4) a great deduction, sometimes amounting to a net deficit, is made from the revenue derived from sugar, necessitating a corresponding increase in other taxes.

I need scarcely allude to the more general objections, such as that the bounty system forces people to use that sugar which it costs most to produce to the exclusion of that which it costs least to produce, or to use the worse in place of the better sugar; or, again, that it is an artificial interference with an industry, leading to great uncertainty in price, to glut of markets, and to other commercial evils; or, again, that it checks the advance of freedom of exchange among nations, and forces industry and trade into unnatural channels.

There is thus ample reason for the existence of a wide desire among Governments and peoples to put an end to the system. I thus pass to the second question—How can this conference aid in the good work?

Watching the recent history of the question, we note that a series of conferences have been held, and that each conference has advanced matters one step. The last, in 1877, arrived at the general conclusion that the system was bad, and that manufacture and refining under Excise supervision was a good and complete remedy. But the conference separated without coming to a decision on the necessary corollary—how to enforce such a decision. Would all sugar States agree to adopt this method? How could recusant States be dealt with? It was at this stage in the settlement of the question that various means were recommended for adoption by the United Kingdom and other States; and among these means we find—(1) prohibition of importation of sugar from countries giving bounties on export; (2) imposition of a duty equivalent to the bounty on all sugar which had earned a bounty on export; (3) imposition of a duty on all beet sugar.

Such remedies, however, are objected to for a variety of reasons; and the chief reason is that they are merely local and do not touch the main questions of a sanction to an international agreement. To meet this latter ultimate need I would venture to propose that a convention might be drafted, assented to and ratified, containing three simple clauses, to the following purport:—

(I.) The signatories bind themselves individually to (1) forbid bounties being obtained on sugar within their frontiers, and (2) to make it penal to obtain drawbacks even one farthing in excess of what has been paid in duties.

(II.) The signatories bind themselves, whenever they wish to raise revenue from sugar, only to allow manufacture or refining under Excise supervision.

(III.) The signatories declare that, without regard to country of origin, all articles which have received a bounty on export are, *ipso facto*, in a different category, as imports, to similar articles which have not received bounties, and may be treated accordingly.

The first two clauses put a stop to the system locally, and the third clause, as it were, codifies an important point in international law; the signatories are left perfectly free in their particular method of action in regard to recusant States, but those States are placed at the mercy of the signatories; and there is good reason to suppose that the very existence of such a power would have an irresistible effect in drawing all sugar States within the circle of the signatories.

I trust these suggestions may aid in clearing the public mind on the subject and in bringing about that substantial success which I am glad to see the apt and able president of the conference so confidently anticipates will result from its deliberation.

I am, your obedient servant,

GEORGE BADEN-POWELL.

TO THE EDITOR OF "THE TIMES."

Sir,—Any opinion of Sir Louis Mallett on a question of political economy must carry much weight, but I cannot assent to his views with regard to the foreign bounties on sugar. I suppose I may assume that he admits the great boon of cheap sugar to our population, and that he does not object to it in the interest of our sugar industry; but I should like to ask whether, if foreign Governments refuse to move in the matter, he would recommend retaliatory duties. It is because these bounties give us cheap sugar, and not because of the bad effects which Sir Louis Mallet contemplates, that our protectionists wish to see them abolished, and one reason why I object to the action of the Government is that it gives strength to the protectionist delusion that cheap sugar is a bad thing.

The immediate effect of these bounties is to give us a present of millions at the cost of our protectionist neighbours, and to encourage our exports proportionately. I therefore cannot think that the loss of these advantages would be compensated for by any slight increase of our trade which might follow the larger production in other countries which their abandonment of their present policy with regard to sugar might occasion.

I am aware that former Governments in this country, as well as the present one, have tried to get rid of these bounties; but this is not conclusive for free traders, who remember that successive Governments, both Liberal and Tory, were at one time in favour of the maintenance of the Corn Laws.

Your obedient servant,

F. LEVESON-GOWER.

December 15th.

TO THE EDITOR OF "THE TIMES."

Sir,—The admirable letter of Sir Louis Mallet in *The Times* of to-day brings out most clearly the fact that bounties are not only destructive of free trade, but also injurious to the interests of this country. There is one paragraph, however, in his letter which I would ask Sir L. Mallet to reconsider. He says:—

> "With regard to Mr. Leveson-Gower's statement that the effect of the abolition of foreign bounties on sugar would be the same as that of the imposition of an import duty on such sugar . . . I would only observe that the first measure would leave each country free to employ its industry in the most economical manner, while the latter would give an artificial protection to a particular British industry, thereby diverting trade from its natural channels."

It is not clear whether Sir L. Mallet is discussing a duty which does or does not exceed the bounty. If he means a duty equivalent to the bounty given, then it appears to me Mr. Leveson-Gower is right, and Sir L. Mallet wrong.

Let us assume the simplest case possible. Suppose that Germany gave a bounty of £2 per ton upon her exported sugar and that no other country gave bounties. Suppose also that England placed a duty of £2 per ton on German sugar and admitted all other sugar free. Mr. Leveson-Gower, as I understand, contends that the result would be the same as if Germany removed her bounty and England removed her duty. It seems to me obvious that the result to the English consumer, and also the effect upon the industry generally, would be identical in the two cases.

Your obedient servant,

N. LUBBOCK,

Chairman of the West India Committee.

51, Lime Street, E.C., December 13th.

TO THE EDITOR OF "THE TIMES."

Sir,—I may perhaps be allowed to say a few words in reply to the questions addressed to me by Mr. Leveson-Gower and Mr. Nevile Lubbock in *The Times* of to-day.

Mr. Lubbock asks me to reconsider my opinion that the effect of the withdrawal of foreign bounties would not be (as stated by Mr. Leveson-Gower) the same as that of the imposition of an import duty on foreign sugar, and he asks whether in the simple case of a bounty of £2 per ton by Germany on the export of refined sugar (no bounties being granted by any other foreign country), a countervailing import duty of £2 per ton in this country would not have the same effect as the withdrawal of the bounty.

I do not know how Mr. Lubbock can have supposed that the statement of Mr. Leveson-Gower upon which I commented can have had any reference to retaliatory countervailing duties, but the letter of the latter in *The Times* of to-day dispels all illusions on this point.

The special case put by Mr. Lubbock is of a different kind, and is one of practical policy as well as of abstract principle; but if it were ever to arise, I should still adhere to my opinion, because, when a retaliatory policy is once adopted, it is impossible to know where it will stop, and because the principle of regulating our fiscal legislation by that of other countries, and of attempting by Government interference to equalize the conditions of production, would, if once admitted, seriously compromise the whole free trade policy.

But the actual question with which we have to deal is very different from that suggested by Mr. Lubbock. Instead of one foreign bounty, there are several, and these vary in amount. Any attempt, therefore, to neutralise them by countervailing duties would render necessary a system of discriminating rates, which, even if it were not in contravention of existing treaties, would, I believe, lead to every kind of evasion and administrative difficulty, and thus fail to restore trade to the natural channels which it would find if all bounties were withdrawn.

For these reasons (and this is my answer to Mr. Leveson-Gower) I have always held that, great as are the evils of bounties, the adoption of a retaliatory policy would tend to perpetuate and aggravate them.

I am, &c.,

LOUIS MALLET.

Englefield Green, December 17.

THE WEST INDIA COMMITTEE AND THE SUGAR CONGRESS.

West India Committee, 51, Lime Street, E.C.,
London, 25th November, 1887.

THE BARON HENRY DE WORMS, M.P., &c., &c. &c.,
President of the International Sugar Conference.

Sir,—At an interview with which you favoured a deputation from this Committee on the 23rd inst. it was understood that the statement which was then made by our chairman should be supplemented by a written communication.

We understand that the Conference is intended to be the means of arriving at a common understanding to form the basis of a Convention binding the different Governments to bring their respective systems of bounties to an end at a given date. We believe this end could be most effectively obtained by the abolition of all drawbacks, which would be brought about by the adoption of manufacturing and refining in bond, without, however, excluding the consideration of any equivalent proposals.

In regard to any contracting powers which neglected their engagements to abolish bounties, or afterwards resumed such bounties, and also any non-contracting powers which might continue their system of bounties, it is obvious that other foreign powers agreeing to the said abolition, and faithfully adhering to their engagements, would reasonably expect that Her Majesty's Government should consent to those considerations or measures which might be necessary to prevent the produce of such contracting powers from being placed in a more disadvantageous position in the English markets than produce coming from countries where bounties were continued to be given.

We, however, hope that the Conference may lead to the abolition of bounties in all the countries now granting them, and that it may not be necessary to adopt actual measures of defence against any bounty-giving powers; but it would be eminently desirable, indeed essential, that the non-bounty giving countries should be secured from any disadvantage that might possibly arise to their produce in English markets by reason of their having, in pursuance of a Convention with this country, abolished their bounties.

An important point that will doubtless be considered by the Conference will be the bearing of bounties upon most favoured nation engagements. We submit that the grant of export bounties is a direct violation of the spirit and intention of the most-favoured nation article, and any measures of redress rendered necessary to counteract such violation must be deemed within the liberty of action of any treaty power, notwithstanding the fact that such power is a party to the favoured nation article.

If, however, without any waiver or abandonment on the part of Her Majesty's Government of this principle of interpretation as applicable to existing treaties a common understanding could be arrived at by the Conference, and embodied in a separate convention declaratory of the meaning of the most-favoured nation article, we think a very important security against bounties would have been gained for the benefit not only of our sugar industry but of our industries generally. We say a separate Convention because of its general application, without desiring to supersede the agreement to a specific convention for the abolition of all sugar bounties.

The Select Committee of the House of Commons reported "That should the commercial treaties to which this country is a party, prevent Her Majesty's Government from taking part in an International Convention which provides for common action of defence against countries giving bounties, Her Majesty's Government should, on the renewal of those treaties, and also in the negotiation of new ones, take into their consideration the propriety of stipulating for such liberty of action as will enable them in the last resort to impose a countervailing duty." During the negotiations in 1881 for the renewal of a treaty of commerce with France, the French Committee of Home and Colonial Sugar Manufacturers raised this question of the bearing of the most-favoured nation article, and the London Chamber of Commerce also insisted that "any means which might be adopted to restore equality should not be deemed an infraction of a favoured nation clause."

We beg to enclose a reprint of the memorial of the French Committee (see Appendix I.), and extract from letter of London Chamber of Commerce (see Appendix II.) in support of our statement herein.

The West India Committee had, however, in 1880, in official communication with the British Commission, engaged in these negotiations for a renewal of the commercial treaty with France, and we then submitted a carefully-worded memorandum on this point—a reprint of which we also enclose (see Appendix III.).

In conclusion, we venture most respectfully to urge upon the attention of Her Majesty's Government the importance of securing an agreement from the Powers now in Conference to the effect that the signatory Powers, parties to the proposed Convention, agree that Powers having most-favoured nation articles in their treaties are not and shall not be entitled to claim the treatment of the most-favoured nation in respect of goods exported under a system of drawbacks, or of certificates of exportation, or otherwise, which shall permit either directly or indirectly bounties to be derived as a consequence of the act of exportation.

We feel that this would allow of that liberty of action recommended by the Select Committee.

I have, &c.,
(Signed) JAMES L. OHLSON,
Secretary.

APPENDIX I.*

THE COMMERCIAL TREATY AND THE FRENCH SUGAR GROWERS.

The Central Committee of French sugar manufacturers have addressed the following letter to the Minister of Agriculture and Commerce :—

Translation.

"Monsieur le Ministre,

"At a time when negotiations are opened for the establishment of treaties of commerce, the delegates of the indigenous and colonial sugar manufacturers have thought it necessary to call your attention to the grievous position in which their industry is placed by the bounties which certain neighbouring countries accord on the exportation of their raw and refined sugars.

"Although these bounties are generally obtained only by indirect means, we have been able exactly to establish their importance, and to show that they have had the effect of tripling (in eight years) the German and Austrian production, and of increasing the exportation from the former country four-fold, and from the latter ten-fold.

"They have had the further effect of enabling sugars thus favoured to drive our products from all the markets of the Levant, to displace them gradually from the position they occupied on the English market, and, finally, to invade even our national market.

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* Reprinted from the *Sugar Cane*, 1882, page 10.

"Reduced to the impossibility of sustaining an unequal competition, our indigenous production is diminishing, and this hindrance to the sugar industry is, without doubt, one of the principal causes of the crisis which weighs upon agriculture in the region of the north of France. Our exportation of sugar, which in 1873 was 270,000 tons (raw, and refined reduced to raw), has not ceased since then to follow a rapidly decreasing course.

"We had for a long time hoped that England, taking care of the interests of her colonial sugar manufacturers, and desirous to give a sanction to the principles of liberty and equality in trade which she has made the basis of her commercial policy, would have consented to unite her efforts with those of France to bring about, by the application of countervailing duties, the abandonment of this system of bounties which falsifies the conditions of production and trade.

"The English Government being apparently resolved not to enter upon such a course, their remains only one means of preventing the absolute ruin of the French sugar industry, namely, to reserve to it at least the home market, by excluding its bounty-fed competitors by means of surtaxes which should annul their bounty.

"We have hitherto declined, Sir, to ask for ourselves favours analogous to those which enable our neighbours to crush us; but we should be wanting in a sacred duty if, as delegates of the industry, we failed to raise our voice at this time in protest against so intolerable a state of things; and you will permit us to say that the Government would be wanting in its own duty if it did not seize the opportunity offered to it by the negotiation of treaties of commerce to try and ameliorate a situation of such crying injustice.

"The desire to secure and develope the exportation of French wine to England is one of the principal motives which led the Government to conclude a commercial treaty with that country. We do not criticise this intention; but permit us, Sir, to remind you that the interests of the sugar industry have no less importance than those of the wine trade in international commerce.

"In fact, although, for the above-mentioned reasons, our exportation of sugar to England diminishes from year to year, the value of the sugar exported from France to that country was, even in 1880, about 59,000,000 francs, while that of the wine exported was only 55,000,000 francs.

"Supported by these brief observations, we consider ourselves authorised, Sir, to ask, in the name of the interests of the indigenous and colonial sugar industries, that you will be good enough :

"1. To keep sugar outside the treaties of commerce so long as it is impossible to obtain the abolition of the bounties on exportation which the Austrian, German, Dutch, and Belgian sugars at present enjoy.

"2. To take care that the introduction, in the treaties of commerce, of the 'most favoured nation' clause does not permit the extension of its application to bounty-fed sugars.

"3. Finally, in all cases where no agreement is come to about sugar, we pray that the necessary legislative measures may be proposed for defending the French sugar industry by striking the bounty-fed sugars, on their entry into France, with truly countervailing duties, which shall be in exact proportion, moreover, with those charged on imported refined sugars.

"The members of the Committee put themselves at your disposal, Sir, if you should consider it desirable to give them an audience.

"We are, &c.,

"For the Members of the Central Committee of the
Home and Colonial Sugar Manufacturers,
(Signed) "F. GEORGES, *President.*
"J.-B. MARIAGE, *Secretary.*"

APPENDIX II.

THE LONDON CHAMBER OF COMMERCE ON EXPORT BOUNTIES.

In a letter recently addressed by the new Chamber of Commerce for London to the Royal Commissioners for negotiating the French treaty, we are glad to see that they speak out very clearly on the subject of export bounties, entirely concurring in the views expressed by the sugar trade and the Select Committee on Sugar Industries. The passages to which we especially desire to direct attention runs as follows :—

"And the imposition of surtaxes, or the allowance of bounties, which would in any respect neutralise the object of the treaty, should, in the opinion of the Council, render it voidable by the party to whose prejudices such surtaxes or bounties shall operate ; *and any means which may be adopted to restore equality* shall not be deemed an infraction of a 'favoured nation' clause."

APPENDIX III.

Memorandum by West India Committee.

In their memorandum on this subject of the 24th October, 1880, the West India Committee urged that,—"The favoured nation clause should be made operative in its full integrity of spirit and intention, and its terms should therefore preclude the grant of bounties on exports. The simplest way, and one that committed this country to no positive action, would be to let the favoured nation clause run in the ordinary way, but be followed by a reservation in the following words:—'But the subjects of either treaty Power shall not be entitled to claim the treatment of the most favoured nation in respect of goods exported under a system of drawbacks, or of certificates on exportation or otherwise, which shall permit either directly or indirectly bounties to be derived as a consequence of the act of exportation.'

"If the favoured nation clause, as now drawn, prevented such action against goods exported under bounty as would restore that equality of fiscal conditions which was the essential object of equality of treatment, British produce would be liable to be struck by any surtax which France might, as she most likely would, impose against sugar or other goods from States granting export bounties.

"The British Commissioners ought to insist that favoured nation treatment should not be claimed in respect of goods receiving bounties on export, and this being acknowledged, that British subjects who export without bounty should not, under the favoured nation clause, be liable to any surtax which France might impose against goods exported from States granting export bounties."

The following is Mr. Görz's Estimate of the European Beet Crops, 1887-88 and 1886-87, with the actual crops for 1885-86 and 1884-5, in tons, December 24th, 1887:—

	Estimate.		Actual.	
	1887-88.	1886-87.	1885-86.	1884-85.
Germany	900,000	987,000	838,105	1,154,817
Austria Hungary	420,000	550,000	369,000	654,000
France	420,000	497,000	298,408	308,410
Belgium	90,000	91,100	48,420	88,460
Holland a. s.	55,000	50,000	37,500	50,000
Russia	440,000	455,000	526,200	386,433
	2,325,000	2,630,100	2,117,633	2,642,120

A comparison of the figures here given for the campaign 1887-88, with those published by Mr. Licht (see page 55), show a difference between the two estimates of 62,500 tons.

OHLENDORFF'S DISSOLVED PERUVIAN GUANO AND SPECIAL MANURES FOR THE COLONIES.

We have received from the London Agency of the Anglo-Continental Guano Works, 15, Leadenhall Street, London, E.C., a pamphlet in which is set forth the value and advantages of Ohlendorff's manures in in the cultivation of the sugar cane, and from which we take the following:—

"The prospects of the sugar cane industries have been gradually assuming a brighter character, and there exists at the present time a very general feeling that the worst has been left behind.

"These more sanguine views of the sugar market are, we think, quite justified. The beetroot crop, in consequence of the exceptional drought, will be this year below the average, and what may be of more permanent advantage, there is a strong likelihood of the prejudicial Continental bounty system being before long favourably modified. The principal European powers are dissatisfied with the fiscal results obtained, and seem disposed to considerably reduce the drawback, or abandon it altogether if a general agreement to that effect can be arrived at.

"Our recent advices from the West Indies are of a decidedly more hopeful tenor, as is very practically indicated by cable orders for further important shipments of our Dissolved Peruvian Guano, and other colonial manures.

"It will now rest with the planters to turn to the best account the improved position by economical manufacture, and by increasing the yield of their plantations.

"Like many other evils, the severe depression through which the sugar-producing colonies have passed may prove to have been a blessing in disguise. It has caused the cultivation of the cane and the manufacture of sugar therefrom to be subjected to a most critical examination, from which are resulting economy in management, the introduction of more suitable appliances, and more care in the selection of artificial manures.

"In this latter respect, much valuable information has been afforded by the series of trials which have been conducted during the last two years at the experimental fields at Dodd's Reformatory, Barbados, by Professor Harrison, Island Professor of Chemistry and Agricultural Science, and Mr. John R. Bovell, Reformatory Superintendent. The experiments have been undertaken to ascertain the relative value of the different fertilizers used for the sugar cane, and the last report, carefully and elaborately compiled by the above two gentlemen, has recently been published by order of the Barbados House of Assembly.*

"One particularly interesting group of trials was arranged to show what form of nitrogenous manure can most profitably be used.

"The following extract shows what manures were applied and the results:—

		Costing.	Produced† available lbs. of Sugar.	Net pecuniary result.	
		Dols.			*Dols.*
94 lbs. Soluble Phosphates 6 lbs. reverted ,, 30 lbs. Potash	+ 50 lbs. Nitrogen from Sulphate of Ammonia	13·83	7517	profit	4·77
Do.	75 do.	18·01	7812	,,	4·28
Do.	100 do.	22·21	7789	loss	0·21
Do.	50 Nitrogen from Nitrate of Soda	14·03	7368	profit	2·64
Do.	75 do.	18·31	7111	loss	4·77
Do.	100 do.	22·61	7087	,,	9·39
20 loads of Farmyard Manure		40·00	8372	,,	10·71
89 lbs. Soluble and assimilable Phosphates, 22 lbs. Potash, 30 lbs. Nitrogen,	applied in the form of Ohlendorff's Early Cane Manure and Dissolved Peruvian Guano	12·62	8292	profit	15·67

PER ACRE.

"The following points in these results are worth carefully noting—viz., that by augmenting the doses of sulphate of ammonia an increased yield was obtained, but not sufficient to compensate for the extra cost; that nitrate of soda as a sugar cane manure proved, in accordance with previous experience, inferior to sulphate of ammonia, and when applied in large doses gave a decided loss; that farmyard manure produced the largest crop, but, owing to the high cost of applying such a bulky manure, resulted in a heavy loss; that the most favourable result was produced by Ohlendorff's Early Cane Manure and Dissolved Peruvian Guano, which with the moderate outlay of $12·62 gave a net profit per acre of $15·67. The individual canes grown with these manures were the largest, and contained only 9·84 per cent. of fibre, the average percentage being over 12 per cent.

"If larger quantities of our manures had been applied, the yield would have been proportionately greater, as is shown by numerous reports (unsolicited) which reach us, and of which the two following are recent specimens:—

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*For this Report see *Sugar Cane* for September, 1887, page 465.

† Available lb. of sugar per acre means the number of lbs. of crystallisable sugar per acre indicated by the polarisation of the juice, less 1½ times the lb. of glucose formed by chemical analysis.

" 'I use your manures chiefly, and have just finished reaping 260 tons of sugar net, and over 21,000 gallons molasses from 82½ acres of canes, all first crop.'

" 'A spot of canes on the plantation I am now staying on, the property of my brother, yielded six hogsheads and a quarter to the acre, exclusive of molasses, during the present crop. The hogsheads weighed about 17¾ cwt. net. The young canes on many estates which had your Early Cane Manures kept greener than any others during the dry weather.'

"In the 1886 experiments conducted by the Barbadoes Society, the plot manured with 5 cwt. of Ohlendorff's Dissolved Peruvian Guano gave an increased yield of 500lbs. of available sugar over that obtained by the best of the other chemical manures.

"Such results simply confirm the practical experience of twenty years in all the sugar-growing colonies, and accord with the expressed opinion of the leading agricultural authorities, as shown by the following extracts of their reports:—

"The late Dr. Augustus Voelcker, F.R.S., then Consulting Chemist to the Royal Agricultural Society of England, &c., reported:—

" 'A careful examination of your Dissolved Peruvian Guano has shown me that it is *the most powerful, intrinsically valuable, and best prepared compound fertiliser* which has ever been brought under my notice.

" 'The highly concentrated state and fine condition of Dissolved Peruvian Guano render it peculiarly valuable to planters, as they obtain in it the largest amount of the more expensive and efficacious fertilising matters in the smallest compass, without the admixture of materials which merely increase the bulk and add nothing to the intrinsic value of the manure.

" 'There can be no doubt as to the superiority of your Dissolved Guano as a manure for *sugar canes* in comparison with raw guano.'

"Professor Harrison, Island (Barbadoes) Professor of Chemistry and Agricultural Science:—

" 'In the Dissolved Peruvian Guano the principal points which are worthy of notice are—

" '1st. Its high percentage of nitrogen, consisting chiefly of ready-formed ammonia derived from the salts of ammonia and from the action of sulphuric acid upon certain of the organic compounds naturally present in Peruvian guano, and in part from the addition of ammonium sulphate. The remainder is present in the form of nitrogenous organic compounds almost entirely soluble in water and in ammonium citrate, thus ensuring the even distribution of the nitrogen throughout the soil.

"'2nd. The high percentage and condition of the phosphates. These consist chiefly of the phosphates soluble in water, thus securing rapid and even distribution; whilst of the phosphates insoluble in water, the larger proportion being soluble in ammonium citrate solution, is immediately available as plant-food, the remainder, consisting of guano phosphates in a finely-divided condition, is of much greater manurial value than insoluble phosphates derived from mineral sources.'

"Dr. T. L. Phipson, Ph.D., F.C.S., &c.:—

"'The Dissolved Peruvian Guano of Messrs. Ohlendorff and Co. constitutes a very valuable artificial manure. It is evidently prepared from genuine guano, and will give satisfactory results with almost any crop, and upon almost any variety of soil. Besides containing a large amount of nitrogen-yielding principles, it possesses the property of fixing the ammonia contained in the humus-bearing clays of the tropical plantations, so that *as a nitrogenous manure it is really much more valuable than is represented by its yield of nitrogen to analysis.*'"

Ohlendorff's Dissolved Peruvian Guano is guaranteed to contain—

Nitrogen equal to 9 per cent. non-volatile ammonia.
18 per cent. soluble, } Guano
4 per cent. assimilable, } Phosphate.
4 per cent. sulphate of potash.

Ohlendorff's Early Cane Manure is guaranteed to contain—

Nitrogen equal to 5 per cent. ammonia (chiefly organic).
20 per cent. soluble, } Phosphate.
and assimilable, }
13 per cent. sulphate of potash.

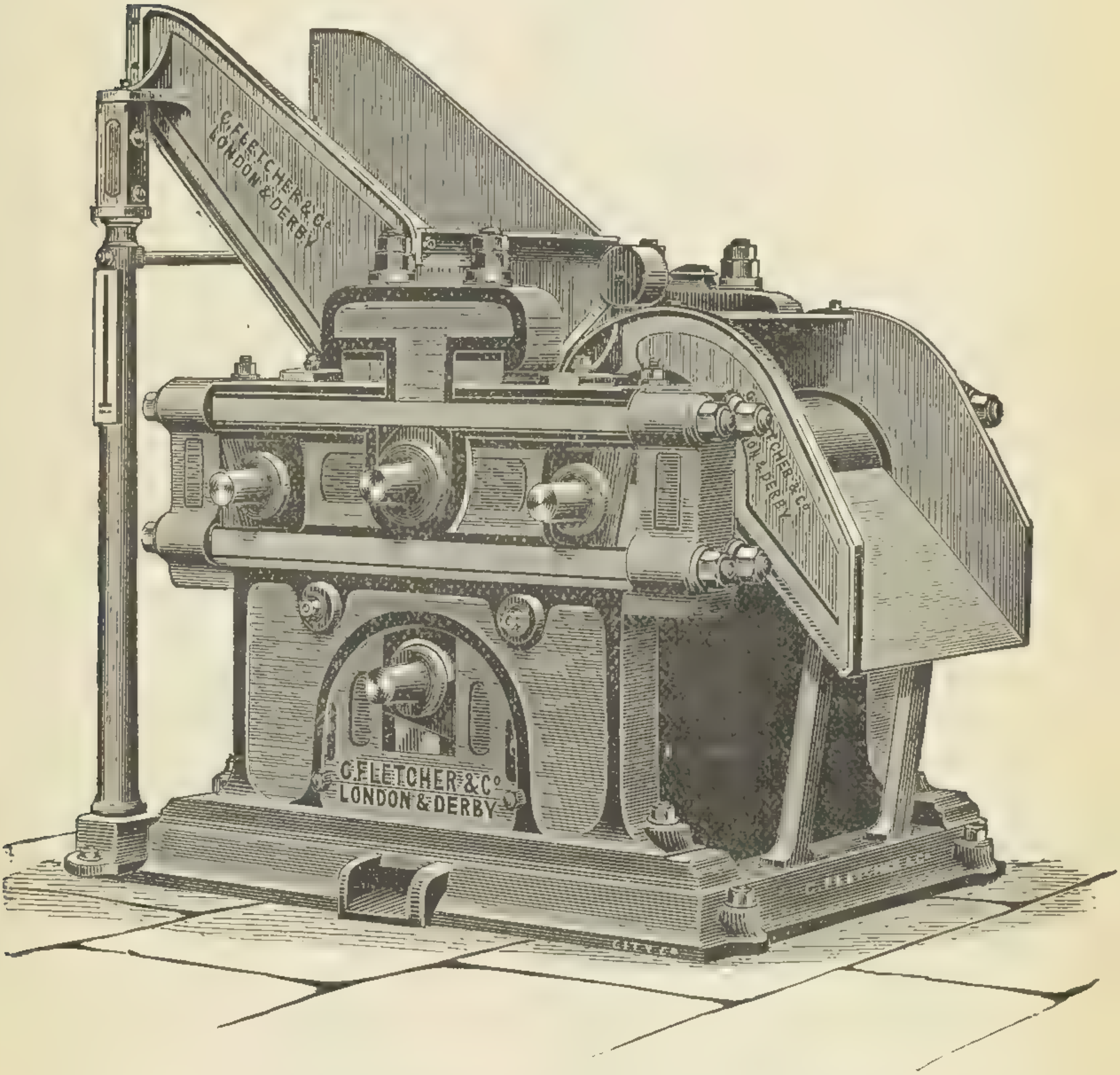
Ohlendorff's Special Cane Manure is guaranteed to contain—

Nitrogen equal to 9 per cent. non-volatile ammonia.
18 per cent. soluble, } Phosphate.
4 per cent. assimilable, }
7 per cent. Sulphate of potash.

In Mr. Harrison's paper on the selection and application of manures for the sugar cane in the island of Barbadoes, given in our May number, page 249, special reference is made to Ohlendorff's manures.

THE SUGAR INDUSTRY.

TRIPLE-GRINDING SUGAR MILL, WITH MACERATION APPARATUS,



Invented by Messrs. A. LEBLANC and G. FLETCHER.

Extract from the Spanish newspaper "El Pais," published in Havannah, Cuba, on 25th August, 1887. (Translation.)

As the Sugar Industry will be greatly benefited by the introduction of this Mill, and as the question itself is one of considerable importance, we have much pleasure in publishing an interesting letter, written to one of his friends by Mr. Francisco de Arrietta, the well-known civil engineer, who is an authority on all matters relating to this subject. This noteworthy communication is the result of personal attendance at a public trial of the mill, and is as follows:—

Havannah, 21st August, 1887.

Dear Mr. Alvaro Reynoso,

In compliance with your wish to receive a written description of the result of the second trial, in my presence, of the Four Roller and Triple-Grinding Sugar Mill invented by Messrs. Leblanc and Fletcher (and manufactured by Messrs. Geo. Fletcher & Co.), as well as my opinion thereon, I hasten to send you the following details:—

I shall confine myself to the experiments made, on the 17th instant, on crystaline sugar cane, being remains from the spring kindly supplied by Mr. P. Goicoechea, who, as well as a number of others residing in the neighbourhood, witnessed the operations, which were conducted on the estate "Alexandria."

This sugar cane was of 14 or 15 months' growth, rather hard, short-jointed, and scarcely one-inch thick. Judging from its appearance, we might fairly assume, without being far wrong, that it contained at least 13 per cent. of liqueous fibre, and consequently 87 per cent. of cane-juice. Under these circumstances, it was found that (the weight of cane before passing through the mill having been taken) Messrs. Leblanc and Fletcher's mill, driven by a water-wheel, yielded 21·70 per cent. of its weight in bagasse, which was almost *dry*, and 78·30 of juice. Such a result may be set down as unequalled—one, moreover, that will necessarily attract the attention of all persons acquainted with, or interested in, the matter under consideration.

Another characteristic fact may be here mentioned: the bagasse, on its delivery from the mill, forms, from one side to the other of the bagasse roller, a perfectly homogeneous layer, composed of small pieces some three inches, more or less, in length, *so dry* that it may be conveyed at once direct, by the usual appliances, through the hoppers to the furnaces; thus, a fuel of first-class character is promptly provided.

It will, therefore, be seen that the extraordinary and considerable yield of this mill implies immense advantage to all concerned, in being able to dispense with the usual arrangements for drying the bagasse, which involve large outlay for manual labour, and to obviate the inconveniences of stoppage and accident to which the present mode of drying is exposed, and which detract more or less from its useful effect.

Another advantage following the former is that the main roll and the bagasse one do not become foul or covered with particles of bagasse, as is the case with existing processes. In fact, the iron (or surfaces of the rollers) will be seen clean and almost dry. This arises from the circumstance that the juice proceeding from the third crushing falls, in the form of rain, and is not re-absorbed by the bagasse which passes so very regularly from below to above: the point of contact being so close that the rollers almost touch, their separation being less than $\frac{1}{16}$th part of an inch.

Add to this that, among the bagasse, there are not found pieces of cane half ground, or more or less whole, as invariably happens in sugar mills in common use, and with which we are all so well acquainted, particularly toward the extremities of the rollers next the flanges; nor is there the irregularity in the distribution and delivery of the bagasse as is seen in mills at present in use.

You ask for my opinion, and I now give it, based, as it is, on the facts just narrated and after personal examination. Briefly, then, I may state that Messrs. Leblanc and Fletcher's mill is as practical as ingenious, and, so to say, a rational one, decidedly superior in effect; enabling the planter to secure the most highly advantageous results, and to compete most successfully with the producers of beetroot sugar—thanks to the increased yield of juice from this mill to the extent of 15 *to* 20 *per cent.* if not more, and this at a much less expense than is incurred by using so-called auxiliaries, such as the "machine for breaking the cane" before entering the grinding mill and the "defibreur," as well as an additional mill for re-crushing the bagasse from the chief one as it is commonly called.

This mill essentially differs from others with four rollers in the practical disposition of its various component parts, the rigidity and peculiar form of the two cast steel knives, or bagasse turners, so firmly fixed between the standards of the mill, and the peculiar appliance for adjusting them to the rolls so as not to admit a single thread between them.

With respect to the cast-iron contrivances serving as supports or standards for the bearings of the steel axles of the four rollers, &c., they are both strong and ornamental of special form, and are fortified by the very strong thoroughfare bolts across them, which also serve to secure the side caps and sustain the pressure from the outer rolls, and thus prevent the probability of breaking the standards during the heaviest grinding.

The centre or main roller, the steel pinion of which imparts its rotary motion to the pinions (also of steel) of the cane and bagasse rolls, is placed above the horizontal line representing the centres of the side rollers, and is in fact somewhat larger in diameter than the others. The opening between the rolls for cane, in the first pressure, is from $\frac{3}{4}$ to $\frac{7}{8}$ parts of an inch, as in the ordinary modern mills, while on the bagasse side or third pressure, it is less than $\frac{1}{16}$ of an inch, or if desired may be iron and iron, although I consider that unnecessary. The third roller, which effects the second pressure, is situated below the main roller in vertical centre line and is geared by steel pinion with the main roll in like manner to the others—for this second crushing a space between the rolls of $\frac{1}{8}$th of an inch is allowed, in order that this pressure may be greater than the first. The rolls work at a speed of 2 to $2\frac{1}{2}$ revolutions per minute.

It will thus be seen that by means of this arrangement the sugar mill I am now describing accomplishes not only that which is done by the most modern machines, which latter yield during continuous grinding only about 62 *or* 63 *per cent. of juice* and which deliver the bagasse, still (more or less) rich in juice, thus necessitating the inconvenience of drying by exposure in the atmosphere; but by the severe third crushing to which it submits the bagasse when it is in a similar condition to that in which it is left after the second crushing by the old style of mill, the higher percentage of juice as before mentioned is obtained, while the bagasse is broken and dry, and immediately fit for fuel—this in consequence of the juice flowing back *from the roll* and not being re-absorbed by the bagasse when leaving the mill.

The cast steel knives, of great resisting power and of peculiar and practical shape, serve the purpose of smoothly and evenly guiding the cane, as yet only partly ground, from the first pressure, and also the bagasse from the second (still impregnated with more or less juice); carrying the layer of cane and bagasse over their inclined planes (about 45°) with great facility, so that it may be each time submitted to a more intense pressure.

Such, in brief, are the main points that recommend this apparatus to attention, and I am convinced it is destined to bring about highly important economical advantages to our sugar industry.

To sum up, Messrs. Leblanc and Fletcher's mill—so ingenious and yet simple in mechanism, while so reasonable in cost—combines all the advantages of the best modern machines, and renders all the services expected from the "cane breaking machines" an "defibreurs"; also renders unnecessary the use of a second or auxiliary mill for re-crushing the bagasse, which is a very costly acquisition.

Before concluding these remarks, I may add, that the construction of the knives or bagasse-turners, is such that steam may be injected at will into the cane, or bagasse, during its passage through the mill, thus carrying out an antiseptic process, and preventing the atmospheric air acting deleteriously on the cane-juice, and performing the process of maceration.

In conclusion, I have pleasure in expressing thanks for the kindly and gratuitous consideration of Mr. Goicoechea, and the facilities afforded to Mr. Leblanc, by which he was enabled to set up and work this important Sugar Mill, which I now testify to be an invention that must necessarily conduce to the progress of our national industry and the prosperity of our country, so much desired by us all.

I am, &c., &c.,

(Signed) FRANCISCO DE ARRIETA.

SUGAR AND THE UNITED STATES' TARIFF.

The following we take from Messrs. Willett & Hamlen's *Circular*, of December 8th:—

Congress has assembled, and the President says its principal business should be a reduction of the tariff in order to dispose of the surplus revenues. It is quite possible that free raw sugar may be finally settled upon as the best way out of the difficulty. Refiners would not object to this, and there are no other interests of importance involved, except those connected with the Louisiana Crop. Beet sugar culture is a proved failure in this country, and Sorghum is in its infancy, and too uncertain to be considered. Free sugar would remove $56,000,000 surplus, and largely increase the consumption, and the business of refiners and distributors of refined sugar. A partial reduction of the duty on sugar would also increase the consumption and importation, but would not remove the surplus. At the present rate of duty, consumption is gaining each year. At half the present duty a rapid jump upward in consumption would result. Instead of 53 lbs. per capita. we would probably reach 73 lbs., as in the United Kingdom under free sugar. Nothing short of free sugar would be likely to reduce revenues on that article except temporarily.

THE LONDON TRADES COUNCIL AND THE SUGAR BOUNTIES.

DEPUTATION OF THE LONDON TRADES COUNCIL TO BARON H. DE WORMS AT THE FOREIGN OFFICE.

On November 29th Baron H. de Worms (President of the Sugar Bounties Conference) received at the Foreign Office a deputation from the executive of the London Trades Council in reference to the sugar bounties. Baron H. de Worms was accompanied by Mr. C. M. Kennedy and Mr. F. G. Walpole (British delegates), Mr. A. E. Bateman and Mr. Farnell (secretaries to the Conference), and Mr. Gosse, Mr. Lawrence, and Mr. Eyre Crowe (attachés).

Mr. GEORGE SHIPTON, on behalf of the London Trades Council, speaking of the injury inflicted on British labour by the operation of foreign State bounties, stated that the London Trades Council represented the only organised body of artisans and mechanics in the metropolis, having a constituency of upwards of 26,000. The London Trades Council submitted that the feeling on the subject of foreign State bounties was not confined to any particular trade or locality, but was in the truest sense general. That feeling of opposition to foreign State bounties arose not only from a sense of the injustice inflicted on the industries directly attacked, but also from the knowledge that when so many were thus affected by the operation of those bounties, the workers lost with their employment their purchasing power.

Before the London Trades Council took action on the question they made a careful inquiry into the extent of the injury inflicted upon workpeople. They had made inquiries of employers who were special manufacturers of machinery used in the production of sugar, and they found that in nine firms alone they were employing fewer engineers by nearly 6,000 than they were four years ago, entirely owing to the foreign State bounty system. By the operation of foreign State bounties labour was lost to more than 50,000 hands in this country. In seven trades immediately affected—the engineers, carpenters and joiners, steam engine makers, ironfounders, boiler makers, pattern makers, and blacksmiths—the effect of the bounties was severely felt. In 1881 the payment by these seven societies to their unemployed members amounted to £83,358, whereas during the last year the total expenditure for unemployed members was £208,495.

With regard to the allegation that in consequence of cheap sugar the development of the jam and confectionery trades had absorbed the labour thrown idle by the closing of so many refineries, they submitted that it was without foundation in fact. In the year 1877 the total consumption of sugar in the United Kingdom was 900,000 tons, and the price of the best Demerara crystals was 36s. 6¾d. per cwt. The price gradually fell year after year till 1886, ten years later, when the same best sugar was selling at 16s. 5¾d. per cwt.—just half the price; and yet the total consumption with the ten years' increase of population had only reached 1,100,000 tons. In fact, during 1885 the national consumption of sugar was 20,000 tons more than it was during last year. The real cause of the expansion of our jam trade was that there was no duty on sugar in this country, whereas in foreign countries there was a heavy duty. The utter fallacy of this jam theory was further shown from the fact that sugar was at this moment dearer by £4 per ton than it was three months ago.

They believed that the first step should be to endeavour to secure the adhesion of as many bounty-giving countries as possible to form a Convention with England to give up the bounties, England undertaking on her part that such countries should not be placed thereby at any disadvantage on English markets by those countries which refuse to join this Convention. In the event of a majority of the countries agreeing to join such Convention, possibly the prohibition of the bounty-fed products of the other countries might best meet the case. If, however, the whole of the foreign countries refused point blank to remove the bounties or to join a Convention having that object in view, then, in defence of our national industries, and to avert a social danger, a countervailing duty equal to the bounty, and continued only so long as the bounty was maintained, would be the effective remedy. They did not disguise the fact that a countervailing duty was repugnant to a majority of the working population, but if no other course was capable of removing these pernicious State bounties, then, under the circumstances which they mentioned, they, as free traders, demanded a cessation of the violation of free-trade principles by a foreign State bounty. They were prepared to recommend this policy to their fellow-workers throughout the United Kingdom, in accordance with the policy suggested by the essayist who obtained the Cobden Club prize of £100 in 1879, as the most acceptable and effective plan of restoring free-trade in our English markets.

Baron HENRY DE WORMS, in reply, said: I have listened with the greatest possible attention and with very great pleasure to the admirably lucid statement which Mr. Shipton, on behalf of this very important body, has laid before me. I need not say how thoroughly I recognise the importance of the body which you represent, as it really and truly embraces almost every trade in the country; and I think that the remarks which you have made gather additional importance from the fact that by looking through the list of the various trades associated with your society, of course there are a great many who are not directly or indirectly connected with the sugar industry, and therefore I take it that it is not so much a question of affecting any particular industry, but a general protest against the system of bounties which you, on behalf of those you represent, consider to be prejudicial to the trade of the country. Again, I look with great pleasure on one statement in the beginning of the document which you read to us—namely, that at the deputation which was received by Lord Salisbury on the 22nd of July last, the principle which you then adopted, and which you still adhere to, was to denounce State bounties as a violation of the principles of free trade, and calling upon the Government to use every effort in harmony with the principles to secure the speedy abolition of those bounties. I think that that statement is an extremely valuable one, inasmuch as it disarms those who are inclined to think that the movement which you yourselves advocate, and which the Government have taken up, would be in direct opposition to those principles of free trade which now govern the commerce of our country; and the words which Lord Salisbury used on the 22nd of July I think might again be repeated with advantage, when he said: "It is quite natural—in fact, I should be very much surprised if it were not so—that very great indignation should exist at seeing that our own eagerness in the principles of free trade is, as it were, turned against ourselves—(hear, hear)—and that, by what has been fairly described as an illegitimate conspiracy, we are driven out of the industry of our own markets." Well, I need scarcely say that I thoroughly endorse every word which fell from the Prime Minister, and the views he so admirably expressed on that occasion. And I would further point out that on that occasion he informed you that he was unable to enter into any details as to the remedial measures which might be necessary to put a stop to this system because the Conference was about to be summoned. Now we are a step further. The Conference which he promised to you on the

22nd of July is now a fact, and is meeting daily, or almost daily, within these walls; and you, in your memorial which you read, asked that we should endeavour to secure the adhesion of as many countries as possible to give up the bounties.

Without going into details of the Conference, the particulars of which of necessity must be for the present moment sacred, I think I may say, without any very great violation of confidence, that that is one of the great objects which the British delegates have in view. Of course, if the adhesion of the great bounty-paying Powers were assured, then the bounty system of itself must die a speedy and a natural death. I am sure you will excuse me if I do not go into any of the other suggestions which you have made—very valuable suggestions, no doubt, but suggestions which, in the delicate position in which I find myself, as President of the Conference, it would not be right for me to discuss at the present moment. But you may be certain of this, that the question is understood and appreciated by the Government, and that they fully endorse what you have said in your memorial. They fully recognise the fact that the industries of this country are generally affected by the bounty system—(hear, hear)—that it is impossible that a system which in itself is so pernicious can only affect the particular industry to which it immediately applies, but that it must, as a matter of fact, affect generally, as I said before, the great industries of the country. Even assuming, as you did at the commencement of your remarks, that the bounty system materially injured the sugar industry, that of itself is a grave evil—(hear, hear)—because, as you point out, it is not only the question of those employed actually in sugar boiling, but it affects a vast number of trades. It affects the boiler-makers, the machine-makers, the engine-makers, and hundreds of other trades. We all know that if any link of that one chain is weak, the whole chain itself is affected, and the whole course of the industry of this country is materially damaged, and must be materially damaged, if countries, who themselves impose protective duties, make those protective duties more and more objectionable to English trade, by assisting their own manufacturers with a profit in advance with which the ordinary manufacturer in this country cannot compete. (Hear, hear.)

The Government thoroughly agree with the views which you have stated to-day. I would further say that I think that you and others may be satisfied with the fact that so many nations for the first time have voluntarily accepted the invitation of Her Majesty's Government to come to England to discuss this bounty system. If there were any prejudice in their minds, or if they were wedded to that system, I think we may reasonably assume that they would not have met us here in Conference to see what can be done. But I venture to think, without interpreting the ideas of those who are not present, that they themselves believe that, although they have a protective system, this bounty system is excessive and improper, even in relation to the system of protection, which already obtains in their countries. I think you may consider, and may take it from me, without going into any details, that the position of affairs is on the whole satisfactory. (Hear, hear.) You may rest assured that the Government of Lord Salisbury, as represented by the delegates representing England in the Conference, will do everything in their power to put an end to the system, which unquestionably is prejudicial to the best interests of the country. (Hear, hear.)

Mr. SHIPTON, in thanking Baron Henry de Worms and the other delegates for their courteous reception, added that the deputation were willing to do all they possibly could to assist the Government in the removal of this injustice. They would do it as thorough free traders, and in the spirit of opening the door to commodities from every part of the world. Instead of trying to exclude the foreigner, it was clearly desirable that he should come here; and all they asked was that he should come here without injustice to our own industries, and be put on precisely the same legal footing as our own manufacturers with whom he is in competition.

The deputation then withdrew.

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., F.C.S., M.I.M.E., Patent Agent, 6, Lord Street, Liverpool; 6, Bank Street, Manchester; and 323, High Holborn, London.

ENGLISH.

APPLICATIONS.

15770. J. F. MADOCKS, Andover, Hants. *The direct steam boiling of acid solutions generally, and the inversion of cane sugar in particular.* 17th November, 1887.

16732. E. BREYER, London. *Improvements relating to the purifi-*

cation of saccharine juices, glycerine, oil, alcohol, and analogous substances. 5th December, 1887.

17289. T. TOMLINSON, London. *Improvements in apparatus for trashing and cutting sugar cane, and for such like crops.* (Complete specification.) 15th December, 1887.

ABRIDGMENTS.

12596 and 12597. C. H. J. FRANZEN, Cologne, Germany. *Process for manufacturing white lump or loaf sugar directly from boiled refinery mass.* 16th September, 1887. Also *Process and apparatus for treating raw, clarified, or perfectly white sugar masses in loaf form by means of the centrifugal machine.* 16th September, 1887. The *masse cuite* is placed in suction vessels, and pure colourless saturated syrup pumped through. The washed colourless crystals are then packed in conical sugar forms with perforated bottoms. These forms are placed in the centrifugal machine radially, their apices pointing inward and their bases fixed upon perforated plates, and hot air admitted at their apices till the loaves are dried.

16827. H. VIVIEN, Paris. *Improvements in apparatus for the manufacture of refined sugar, applicable also to the manufacture of glucose, starch, and similar products.* 22nd December, 1886. The *masse cuite* is run into U or V shaped moulds, and when set the two slabs formed in each mould are placed on cellular or rack wagons, and placed in centrifugal and tightened into place by wedges adjustable by screws; they are then centrifugalled, then saturated with syrup and centrifugalled again.

7119. CARL STEFFEN, Vienna. *An improved process for systematically lixiviating raw sugar by means of aqueous, alcoholic, or other saccharine solutions.* 16th May, 1887. The lixiviating vessels are arranged in series, the washing syrups being passed through each in succession, the pure colourless syrup being passed first through the sugar loaves nearly completely washed, and the syrups that are partially saturated with impurities (through previous operations) being employed on the fresh unwashed loaves. The inventor makes a special claim to warming the raw sugar in cold weather to above 10 degrees centigrade (50 Fahr) before lixiviating, and he also makes another special claim for drying wet kinds of raw sugar by hot air, stoving, or other suitable means before lixiviating!

AMERICAN.

ABRIDGMENT.

373577. S. S. Barrie, Brooklyn, New York. *Centrifugal Machine.* November 22nd, 1887. On a sleeve running loose on the basket spindle, but without lateral play is a non-rotating balance wheel or disc suspended by freely swinging links to several fixed points above the said links, having in the normal condition of the spindle an inclination from their upper ends inward toward the spindle, whereby, as the spindle swings out of the vertical position, the journal-box and counter-balance remain suspended with the axis of the journal-box in line with the axis of the spindle.

GERMAN.

ABRIDGMENTS.

68988. P. Lagrange, Schaerbeck. *Improvements in the manufacture of refined sugar in tablets in centrifugal apparatus, from the cooked masses of sugar manufactories or refineries.* 23rd May, 1885. This process rests upon the following manipulations. 1st. On the drying, in my centrifugal apparatus of the cooked mass of the sugar manufactory or refinery, passed or not, between two grinding stones, according to the system of cooking adopted, after these masses have left the cooking apparatus, and kept at a constant temperature by the introduction of expanded steam in a double external jacket. 2nd. On the previous clarification after the separation of the green syrup, and during the "turbinage" of the tablets, with a colourless syrup saturated with sugar, and the drying of these tablets in the centrifugal itself under the combined action of a current of hot air and steam; or by the use of either of these means separately, always after a clarification and complete discolouring of the tablets, with a saturated colourless syrup. 3rd. On the arrangement inside the centrifugals, of smooth metallic rectangular plates, or in form of oblique prisms, so that as many chambers are formed as tablets required.

36240. W. Kuntze, Körbisdorf. *Improvements in condensers.* 26th November, 1885. The semi-circular trays placed one above the other in the condenser are fixed by means of adjusting screws, which are held in place between projections of the tray and the side of the condenser. These trays are made tight by means of india-rubber strips, which are laid round the trays and bear against the side of the condenser. These india-rubber strips are of V shape.

36427. F. O. Matthiesson, Irvington, in the State of N.W., U.S.A. *Improvements in bone black filters for the purpose of dissolving sugar juice.* 27th October, 1885. The improvement relates to those bone black filters in which the sugar juice is filtered whilst ascending, and the charcoal, which has in the lower part become worthless for filtering purposes, is removed by means of a rotating, scraping, or removing contrivance. In order to prevent the formation in the middle part of this contrivance of a core of unemployed charcoal, this space is occupied by a hollow column. Under the scraping disc revolves a combination of four transporting blades bent into the shape of an Archimedean screw, which clears away the rejected charcoal and takes it in the exit pipe, this arrangement leaves very little space below the plate.

36114. C. SCHEIBLER, Berlin. *Apparatus for the lixiviation of beet root, sugar, or other substances containing sugar by means of volatile liquids.* 20th March, 1884. The extraction vessels of the apparatus represent square boxes which open sideways. These boxes contain a system of flat boxes of perforated plate laid one upon the other, and filled with layers of beet root slices, the sugar of which is to be extracted by means of alcohol. The whole system can move on wheels. The sides and bottom of the box are steam jacketed, whilst the top is provided with a cooling contrivance with dropping devices. Several such extracting vessels are connected with a column distilling apparatus, and a collecting vessel for the alcoholic sugar solution above the still. The lixiviation takes place in a continuous manner, that is to say, the alcoholic sugar solution formed passes through the distilling apparatus in which the alcohol is separated, the latter goes thence into an extraction vessel filled up with beet root slices, at the contact of which and the cooling jacket it condenses and accomplishes thus the extraction of the sugar. The spirit so condensed drizzles from the dropping devices, consisting of points fixed on the lid, and penetrates the perforated boxes laid one over the other and filled up with beet root slices. The residuum, from which as much sugar as possible has been extracted in this manner, is deprived of the alcohol it still contains by means of superheated steam. The alcohol thus removed can be utilised again. The residuum contains albumen as well as the other principles of beet root which coagulate in alcohol (such as pectine, parabine, and the like). The residuum has only a small percentage of moisture, and consequently a higher value as cattle food than the slices of beet roots treated by water.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

January 1st to November 30th, 1887.

Board of Trade Returns.

IMPORTS.

Raw Sugars.	Quantities.		Value.	
	1886.	1887.	1886.	1887.
	Cwts.	Cwts.	£	£
Germany	5,150,382	6,594,274	3,110,875	3,761,799
Holland	255,039	348,613	161,847	188,866
Belgium	624,778	824,169	381,187	464,106
France	37,405	60,231	23,157	35,555
British West Indies & Guiana	1,834,279	1,991,241	1,449,925	1,408,465
British East Indies	739,676	646,062	375,048	301,877
China and Hong Kong	48,257	312	28,005	201
Mauritius	278,750	104,404	174,510	57,158
Spanish West India Islands	21,409	174,758	15,459	108,130
Brazil	511,454	783,638	331,905	423,275
Java	3,803,932	3,013,065	2,782,867	1,935,299
Philippine Islands	531,022	398,786	265,078	180,398
Peru	422,297	389,054	304,677	240,506
Other Countries	572,957	517,789	397,728	292,780
Total of Raw Sugars	14,831,637	15,846,396	9,802,268	9,398,415
Molasses	—	—	135,016	94,119
Total Raw Sugars	—	—	9,937,284	9,492,534
Refined Sugars.				
Germany	1,595,226	2,359,938	1,315,714	1,801,085
Holland	1,093,693	1,346,189	938,003	1,044,597
Belgium	100,812	194,749	92,504	161,267
France	886,693	1,439,484	727,781	1,090,245
United States	1,418,110	777,333	1,225,434	623,249
Other Countries	821,438	108,012	672,411	77,508
Total of Refined	5,915,972	6,225,705	4,971,847	4,797,951

EXPORTS.—Refined Sugars.

	Cwts.	Cwts.	£	£
Denmark	135,508	108,263	90,051	62,671
Belgium	47,884	36,907	33,488	22,570
France	40,801	29,684	33,056	18,576
Portugal, Azores, & Madeira	89,812	72,267	63,331	43,065
Italy	129,910	97,078	89,650	63,705
British North America	18,058	28,752	13,360	20,452
Other Countries	336,789	285,410	254,868	197,955
Total	798,762	658,361	574,804	428,994

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of November compared with the corresponding month of the two preceding years, and the average monthly imports for the year compared with those of 1884, 1885, and 1886, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

Countries from which Sugar has been imported.	"Lumps and Loaves."							"Other Sorts." Including Crushed Loaf, Granulated, Crystallized, &c.							Total.						
	Monthly Average.				Nov.	Nov.	Nov.	Monthly Average.				Nov.	Nov.	Nov.	Monthly Average.				Nov.	Nov.	Nov.
	1884	1885	1886	1887	1885	1886	1887	1884	1885	1886	1887	1885	1886	1887	1884	1885	1886	1887	1885	1886	1887
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
France	2737	2035	1462	1355	717	1709	1087	1621	546	2688	5186	330	12562	11707	4358	2581	4150	6541	1047	14271	12794
Holland	3580	4247	3508	3767	3014	4058	3590	1948	1555	1428	2350	1558	1463	3629	5528	5802	4936	6117	4572	5521	7219
Germany & Austria	552	956	990	1343	523	1246	1315	2380	2859	6634	9382	4826	8032	13224	2932	3815	7624	10725	5349	9278	14539
Belgium	183	214	344	600	230	268	896	151	116	113	282	134	87	370	334	330	457	882	364	355	1266
United States	962	722	854	496	705	1403	..	3386	10654	5078	3035	6620	6920	11	4348	11376	5932	3531	7325	8323	11
Russia	..	..	..	[illegible]	..	..	..	..	..	3412	448	..	..	349	..	..	3412	451	..	.	349
Other Countries	..	..	..	..		..	..	121	12	9	..	171	..	..	121	12	[illegible]	..	171	..	..
Total	8014	8174	7158	7564	5189	8684	6888	9607	15742	19362	20683	13639	29064	29290	17621	23916	26520	28247	18828	37748	36178

SUGAR STATISTICS—GREAT BRITAIN.

To December 24th, 1887 and 1886. In Thousands of Tons, to the nearest Thousand.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1887.	1886.	1887.	1886.	1887.	1886.
London	50 ..	75	314 ..	323	288 ..	308
Liverpool ..	85 ..	77	269 ..	251	278 ..	230
Bristol	3 ..	4	58 ..	59	57 ..	55
Clyde	44 ..	34	234 ..	230	242 ..	198
Total ..	182	190	875	863	865	791
	Decrease ..	8	Increase ..	12	Increase ..	74

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

For the four principal Ports. In Thousands of Tons, to the nearest Thousand. To November, 1887 and 1886.

	STOCKS. December 1st.		DELIVERIES. In November.		IMPORTS. In November.	
	1887.	1886.	1887.	1886.	1887.	1886.
New York	49 ..	96	51 ..	52	40 ..	47
Boston	8 ..	17	10 ..	12	6 ..	12
Philadelphia....	— ..	2	12 ..	9	12 ..	8
Baltimore	.. ..	..	.. ..	..	.. ..	..
Total......	57	115	73	73	58	67
	Decrease ..	58			Decrease ..	9
Total for the Year	—	—	1098	1033	1052	1091

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, December 15th, 1887.

Fair Refining.	96o/o Centfs.	Granulated.	Stand. A.	Stock in Four Ports.
Dec. 15, 1887.—5 3-16c.	5 15-16c.	6⅞c.	6⅝c.	Jan. 1, 1887—102,279 tons.
Dec. 16, 1886.—4 11-16c.	5¼c.	5 13-16c.	5½c.	Jan. 1, 1886— 57,328 tons.
Dec. 17, 1885.—5 9-16c.	6¼c.	6¾c.	6¼c.	Jan. 1, 1885— 89,186 tons.
Dec. 18, 1884.—4¾c.	5 5-16c.	5⅞c.	5½c.	Jan. 1, 1884— 60,900 tons.
Dec. 20, 1883.—6 3-16c.	7 1-16c.	7⅞c.	7⅜c.	Jan. 1, 1883— 50,297 tons.
Dec. 21, 1882.—7c.	7 11-16c.	8¾c.	8¼c.	Jan. 1, 1882— 43,927 tons.
Dec. 22, 1881.—7⅝c.	8 1-16c.	9 3-16-¼c.	8¾c.	Jan. 1, 1881— 66,999 tons.
Dec. 16, 1880.—7⅝.	8 5-16c.	9½c.	9⅛-¼c.	Jan. 1, 1880— 63,558 tons.
Dec. 18, 1879.—7½c.	8¾c.	9½-⅝c.	9¼c.	Jan. 1, 1879— 50,773 tons.
Dec. 19, 1878.—6½c.	7 7-16c.	8¾-⅞c.	8½-¾c.	Jan. 1, 1878— 48,230 tons.
Dec. 20, 1877.—7¼c.	8c.	9⅜c.	9⅛c.	Jan. 1, 1877— 25,885 tons.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE 30TH NOVEMBER, FOR THREE YEARS, IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts.*	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
164	166	31	283	201	20	865	943	799

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING 30TH NOVEMBER, IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts.*	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
1209	444	42	436	229	339	2699	2572	2595

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROP, OF THE THREE PREVIOUS CAMPAIGNS.

(From Licht's Monthly Circular.)

	1887-88.	1886-87.	1885-86.	1884-85.
	Tons.	Tons.	Tons.	Tons.
France..........	400,000 ..	488,299 ..	298,407 ..	308,410
German Empire ..	887,500 ..	997,962 ..	838,131 ..	1,154,817
Austro-Hungary..	425,000 ..	523,061 ..	377,032 ..	557,766
Russia and Poland.	400,000 ..	475,000 ..	537,860 ..	386,433
Belgium	100,000 ..	91,120 ..	48,421 ..	88,463
Holland and other Countries	50,000 ..	50,000 ..	37,500 ..	50,000
Total......	2,262,500	2,625,442	2,137,351	2,545,889

Since the previous month's report (Nov. 19, 1887), Mr. Licht has reduced his estimates by 187,500 tons, viz., 125,000 tons for France, and 62,500 tons for Germany.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

A large business has been done both in raws and refined in the past month, and a further advance in price of from 1s. to 2s. per cwt. all round, has been established.

The market closes very firm, with every prospect of a still further improvement in prices during the next few weeks.

German 88% beet is now 16s. 3d., or 35% higher than it was on 1st October; the advance in cane kinds, as yet, bring only about 25%.

The deliveries in the United Kingdom of raw sugars up to 24th December show an increase, as compared with the same period of 1886, of 11,696 tons, and the imports an increase of 74,355 tons.

The Stocks in the United Kingdom on 24th December were 182,251 tons, against 190,325 tons in 1886, a decrease of 8,074 tons.

Present quotations for the standard qualities, as under, are:—

Floating.			Last Month.
Porto Rico, fair to good Refining	14/6 to 15/–	against	13/6 to 14/–.
Cuba Centrifugals, 96$^{\circ}/_{\circ}$ polarization	16/6 to 17/–	,,	15/6
Cuba Muscovados, fair to good Refining	14/6 to 15/–	,,	13/6 to 14/–.
Java, No. 14 to 15, good to strong	17/3 to 17/9	,,	16/3 to 16/6.

Landed.			Last Month.
Madras Cane Jaggery	11/–	against	10/– to 10/6.
Manilla Cebu and Ilo Ilo	10/6 to 11/–	,,	9/6 to 10/–.

Paris Loaves, f.o.b.	19/–	against	17/6 to 18/–.
Titlers	21/–	,,	19/3
Tate's Cubes	22/6	,,	21/3
Austrian-German Beetroot, 88$^{\circ}/_{\circ}$ f.o.b.	16/3	,,	14/3.

THE
SUGAR CANE.

No. 223. FEBRUARY 1, 1888. Vol. XX.

☞ The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to Henry Thorp, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see page iii.

At page 105 we give the latest respecting the New York Electric Sugar Refining Company, which is shortly to astonish the sugar world.

Saccharin.—We take the following from a Trade Circular recently issued:—

The new scientific discovery—economic in use—packed expressly for the grocery trade.

The remarkable advantages possessed by this product—which really costs no more than sugar at 3d. per pound—renders it indispensable to that great section of our population which cannot take sugar.

Strongly recommended by Physicians. A large sale predicted. Every family grocer should keep it.

Quotations :—

		Retail Price.
½-oz. Bottles, effectively labelled, each with measuring spoon	69/6 per lb.	2/6 per bot.
1-oz. ,, ,, ,, ..	65/6 ,,	4/9 ,,
2-oz. ,, ,, ,, ..	63/6 ,,	9/3 ,,
4-oz. ,, ,, ,, ..	62/- ,,	18/- ,,

All sizes packed in one lb. boxes.
Ready for delivery about February 1st.

The *London Gazette*, of December 24, contains a verbatim report, in French, of the proceedings of the various sittings of the International Sugar Congress, held in London in November and December last.

It is too lengthy to insert in extenso in *The Sugar Cane*, but at page 64 we give a pretty full *resumé* of the same.

The Nova Scotia Sugar Refining Company (Halifax), we learn, made a profit of between 300,000 and 400,000 dollars in 1887. The Company declares a dividend of 10 per cent. for the current half-year, making 13 per cent. for the whole year.

Mr. W. P. B. Shepheard, of Lincoln's Inn, has contributed an article on the "Sugar Bounties" to this month's number of "Time."

This Magazine of Current Topics, Literature and Art, is edited by Walter Sichel, M.A., Balliol College, Oxford, and of Lincoln's Inn, Barrister-at-law. The Publishers are Swan Sonnenschein & Co., Paternoster Square, London. Price, One Shilling.

The Convention of the American Shipping League have adopted a "platform," asking Congress to pass a Bill giving American vessels engaged in foreign trade a bounty of thirty cents per ton for every thousand miles sailed, this allowance to continue for ten years, and for nine years more with annual reduction of three cents per ton. This upon a steamer of 6,000 tons burden, sailing between New York and Liverpool, means a gift to the owners of £1,000, each way. It also recommends the construction of a strong navy, the improvement of river harbours, and the provision of means for carrying foreign mails in American vessels.

The Starch Sugar (Glucose) Manufactory of E. Köhlmann & Co., which has a reserve of M. 275,000, pays this year a dividend of 12½ per cent. on a capital of M. 2,250,000, after writing off for sinking fund, &c., M. 52,526, and paying M. 88,454 for repairs, and placing M. 61,000 to the reserve fund.

The *Praust* Sugar Company, after placing M. 64,350 to the credit of sinking fund, paying over M. 5,353 to employés as presents, &c., and covering a loss of M. 15,000 on share account, pays a dividend of 3 per cent. on a capital of M. 750,000.

The *Haynau* Sugar Company, after writing off M. 56,471, made a net profit of M. 47,000.

In a recent number of a London Financial Daily, is an article on Sorghum Sugar, written it might be, in the interests of Sorghum enthusiasts. In it, it states, that "a sample of the sugar may be "seen at the offices, in Cannon Street, of the Capital Freehold Land "and Investment Company, whose interest in the discovery is due to "the fact that it holds 3,000,000 acres in Texas, three quarters of "which is reported by competent judges to be especially adapted to the "production of Sorghum." In reading most of the statements and opinions put forth in respect to Sorghum sugar, it is very necessary to read between the lines. In another part (page 90) we give Mr. D. D. Cone's report of the Sorghum Sugar Experiments recently made at Rio Grandi, New Jersey. Mr. Cone writes like a responsible man, and does not treat fancies as facts.

The French manufacturers are becoming increasingly uneasy at the news with respect to the Sugar Congress. The President of the latter, Baron de Worms, has been in Paris, and his visit is said to have been a success, and the same is reported from Brussels, which Baron de Worms visited on leaving Paris, and he is now about to proceed to The Hague and Berlin. What the French most fear from a universal abolition of premiums, according to the *Zuckerindustrie* (of January 27th), "is the competition with Germany, "and in this they are perfectly right, for their premiums amount to "three times those of the German manufacturers. But when they at "the same time assert that this means the annihilation of their "industry, this is a gross falsehood. They are, as has been repeatedly "demonstrated, in the advantageous position of being able to secure to "themselves completely the production attained hitherto (which corres-"ponds with the requirements of the inland market), by the application "of the surtax of 7 francs now in force on European sugar, and it lies "in their power, by reducing the sugar duty from 60 francs to 25 "francs, to double the consumption of the country, and as a conse-"quence their own production.

A special general meeting of the proprietors of the Colonial Bank was held on January 26th at the premises of the bank, Bishopsgate Street, for the purpose of considering a Bill introduced into Parliament entitled, "A Bill to alter and extend the constitution and powers of the Colonial Bank."—Mr. Doublee presided.—The solicitor having read the provisions of the proposed Bill, the Chairman said that he need hardly remind them that the court of directors were applying for changes in their Act at the wish and instigation of the proprietors themselves rather than from any feeling on their own part that the changes were necessary. They quite agreed that it would be expedient to make some alteration in the charter ; in fact, they were quite willing to do their best to get all those alterations which the shareholders desired. The principal of these were—first, the absolute certainty as to the liability which would be settled beyond all doubt by the acceptance of the clauses in the Bill referring to the point; secondly, the reduction, if the shareholders so wished, in the number of directors; thirdly, the appointment of a professional auditor instead of the existing auditors; and, fourthly, the public registration of the proprietors. They would quite understand that it was possible that the Treasury might oppose the Bill. In that case there would be nothing for it but to withdraw the measure, and if they did so they would know that it was in their interest. It would never do to try to get this Bill through in the face of Treasury opposition, and thus risk the power that they now enjoyed under the present charter with regard to the issue of notes. They could not tell whether opposition would be offered, but they rather anticipated some difficulties, which they hoped to overcome.

Mr. Alfred Eames, a shareholder, expressed his high satisfaction that the directors had listened to the suggestions made by the shareholders from time to time. He believed that if the Bill were carried it would not only be in the interest of all the shareholders, but would raise the standard of the bank, and would prove of advantage to all concerned in it.—In answer to another shareholder, the Chairman stated that there was no sort of doubt as to the liability of the shareholders being at present limited. He moved—"That this meeting consent to a Bill introduced into Parliament entitled, 'A Bill to alter and extend the constitution and powers of the Colonial Bank,' subject to such additions, alterations, and variations as Parliament may think fit to make therein."

Mr. N. Lubbock seconded the resolution, which was unanimously adopted.

Should any of our readers have a spare copy of the 1st part of Vol. I., (1882) of *Timehri*, being the Journal of the Royal Agricultural Commercial Society of British Guiana, we shall be glad to give a reasonable price for it for one of our subscribers who is desirous of completing his set.

We shall also be glad to take any copies which can be spared of the *Sugar Cane* for June 1883 and 1884, (Nos. 167 and 179) and give published price for them. To be addressed: Office of *The Sugar Cane*, 57, Market Street, Manchester.

THE FOREIGN SUGAR JOURNALS ON THE INTERNATIONAL SUGAR CONGRESS.

The Sugar Congress having arrived at a definite point in its labours, and come to an agreement on certain preliminary questions, it is interesting to note the remarks of the foreign sugar journals.

We may, *par parenthèse*, observe that the remarkable unity with which all the representatives protested the readiness, even eagerness, of their respective Governments to abolish all premiums, was instructive and almost touching. Even where, as for instance in the case of France, they admitted the existence of enormous premiums, it was always "the other naughty boys" who had compelled them to this course of action, and the alacrity evinced in promising to get aid of such objectionable practices was really extraordinary. No one, said M. Sans-Leroy, desires the abolition of premiums more than we do. It is perhaps as yet premature to endeavour to draw any practical inference from this phenomenon, but Lord Salisbury may surely be allowed to congratulate himself on being able to be instrumental in affording an opening for the practical carrying out of such fervent and laudable aspirations.

The German "*Zuckerindustrie*" and the Austrian "*Prager Zuckermarkt*" express themselves as thoroughly satisfied with the results hitherto obtained. The latter points out, with a certain amount of justifiable pride, that it was from the Assembly of Delegates, held at Prague in April, 1886, that the "word of salvation" went forth, which is now to become the common property of the universal sugar industry, namely, the declaration that the tax on the product must be levied on consumption, for there could naturally be no premiums where the sugar destined for export paid no duty. The "*Deutsche Zuckerindustrie*," with its accustomed clear grasp of the situation, at once not only pointed out the first steps that were to be taken, in a general reduction of the duties at present levied, but even boldly indicated the extent to which each individual country could at once safely reduce the rate of duty, and now urges, that if each country will only do its best to increase the consumption of sugar, the question of a supposed dangerous rivalry between beetroot and cane sugar, which is troubling some minds, will be solved in a perfectly friendly manner. Whilst Mr. Herbertz considers the reservation made by Belgium in Article III. of the Protocol as unsatisfactory, he does not foresee any active danger to the ultimate decision of the Congress from this quarter. The real danger seems to him to lie in the direction of France, whose protest against the exceptional action of Belgium, joined to the insertion in the protocol of a clause respecting saccharimetry, he regards as a "mental reservation," which can only be cleared out of the way by some arrangement for the strict keeping apart of the refining of home and of foreign sugars.

Turning to France, we are met by an unqualified and sarcastic condemnation, on the part of the "*Journal des Fabricants de Sucre*," of the proceedings of the Conference and their weak and contradictory results, in perfect agreement with the previous utterances of that journal, as well as with the strong protest of the Syndicate of the French manufacturers, which we have reproduced in previous numbers.

This journal, under the heading—"Why should there be a Convention?" says that, whatever may be the eventual outcome of the proceedings, one thing is certain: the programme presented bears a purely free-trade stamp, as becomes a scheme emanating from the classic land of commercial liberty; but how can the continental powers thus suddenly reverse their habitual policy? As for France, her protectionist policy has, of late, been affirmed in a multitude of instances in which sugar, cereals, cattle, and alcohol have been protected by more or less high duties. Is she going to upset this policy, and after having applied the principles of free-trade to sugar, as is now proposed, are they to be extended to these other products also? Granting that any such declarations as those of M. Sans-Leroy are considered *ad referendum*, will not many see in them the indication of a political right-about-face, which is not justified by anything in public opinion, or even in Parliament. But the representatives of other countries in which the policy of protection is in full force, have equally given in their adhesion. If, in 1881, the great Bismarck considered the effects of the policy of free trade "pernicious," how can he approve that policy in 1887? Each of the signatories to the protocol has most formally reserved full liberty as regards its internal market, while England, by declining to levy countervailing duties, has put the climax to the contradictions of the situation.

M. B. Dureau closes his observations with the words:—"We "are more than ever justified in asking what we had to do at

" the Conference, what we shall have to do there when it resumes its " sittings, and what is the practical utility of a Convention. 'No one,' " said M. Sans-Leroy, 'desires the abolition of premiums more than " we do.' To such imprudent, unpatriotic language the country will " reply, that these premiums are still necessary to our sugar industry, " now, thanks to the law of 1884, emerging from its long depression ; " and that, instead of lowering the banner of that law, which is that " of our emancipation, we must hold it firmly aloft in face of our " competitors."

The tone adopted by the French journals (the "*Sucrerie Indigène*" says the sugar industry now has two swords of Damocles suspended over its head, viz., the threatened abolition of premiums, and the project of M. Tirard) seems somewhat excusable in consideration of their constantly reiterated laudation of the law of 1884, the existence of which has been threatened ever since the hostile report of the Budget Commission in 1887, and is now being seriously endangered by the proposal of the Government to reduce the duty from 50 frs. to 40 frs., and raise the surtaxe of July, 1887, by 50 per cent., a measure which the "*Sucrerie Indigène*" characterises as "spoliation," and which, as stated by the "*Deutsche Zuckerindustrie*," means a reduction of 20 per cent. in the premiums gained by the manufacturers. Mr. Herbertz thinks that whatever happens there seems some prospect of the proposals of the Budget Commission being adopted, and even then the manufacturers will have no reason to complain, for, under the not very hazardous assumption that they will continue in future to obtain an *excédent* of 2¾ per cent., there will remain for them a gain on the taxation of 11 francs per 100 kilos. (4s. 5d. per cwt.) of refined sugar!

The "*Sucrerie Belge*" endeavours to sustain the position taken up at the Conference by M. Guillaume, and asserts, with regard to the proposal for refining and manufacturing in bond, that it has only been tried in two countries, France and Russia, and the "perfect incorruptibility" of the French employés is sufficiently proved by the fact of the Government being compelled to endeavour to keep some check on their proceedings by means of automatic weighing apparatus, while, as to Russia, we may be permitted to doubt the morality of the subordinate officials, when the audacious venality of the functionaries of every rank is generally admitted. "If Belgium is to make the sacrifices demanded of her, while other nations are to preserve their surtaxes, then the Convention would be for her an anti-national one, and there would be room for astonishment that the Belgian Government should have taken any part in a Conference directed against premiums, without stipulating that surtaxes also should be abolished."

THE INTERNATIONAL CONFERENCE ON SUGAR BOUNTIES.

Abstract of the *Procès-verbaux.*

The Conference had seven sittings, extending from the 24th November to the 19th December, 1887. The following countries were represented:—Germany, Austria, Belgium, Brazil, Denmark, Spain, France, Great Britain, Italy, Holland, Russia, and Sweden.

First Sitting.

Baron Henry de Worms opened the proceedings at the first sitting by apologising for the unavoidable absence of Lord Salisbury. He was then elected President, Count de Kuefstein being chosen Vice-President. The Secretaries were appointed.

Baron de Worms then welcomed the Delegates, observing that such a Conference could not but conduce to good feeling among the nations there represented. Their presence was a proof that their Governments desired to abolish bounties by mutual agreement. This was the first time that all the Powers had been represented at a Conference, from which he inferred that they regarded the present as a propitious moment for the solution of this question. Even assuming that the bounty system might favour the sugar industry, it must be admitted that a prosperous trade depended on "a system which, by its uniformity, recommended itself to all the nations."

Mr. Kennedy announced that each Government represented had been requested to draw up a memorandum of its sugar *régime*, which would furnish the Conference with the necessary information as to the various systems of assessing the duty.

Count de Kuefstein thought that the Conference would be agreed as to the object to be attained. Every effort to efface the present divergencies was worthy of the greatest sympathy. They hoped that what Great Britain had promoted would not remain without result.

It was agreed to postpone the commencement of the discussion until time had been given to study the various memorandums.

M. Sans-Leroy, the French delegate, objected to a proposal to sit *de die in diem*, because questions would arise which it would be necessary to refer to his Government.

Second Sitting.

At the second sitting the President invited the Delegates to formulate propositions which might furnish a basis for discussion.

M. Kamensky (Russia) thought the best arrangement would be for each Delegate to point out frankly in what way the system of duty and drawback in his country gave rise to a bounty, and to declare whether his Government was prepared "to sacrifice" a portion or the whole of this bounty.

This suggestion was adopted, each Delegate making a statement.

1. M. Jordan (Germany) pointed out that in his country there had been a recent change in legislation which tended to reduce the bounties and was a movement towards their abolition. He was not authorised to indicate what measures his Government would take to persevere in this course, but he could say that the object proposed by the Conference commanded the entire sympathy of the German Government, who were quite disposed to abolish bounties provided the same were done in the other countries. He was instructed carefully to examine every such proposition, and his Government were ready to see whether the proposals could be carried out. He was not, at the moment, prepared to make any proposal.

2. Count de Kuefstein (Austria) gave an historical summary of Austrian legislation since 1865, pointing out that the duty was levied on the weight of the roots as estimated theoretically according to the capacity of the apparatus, the authorities fixing a certain weight of roots as corresponding to each hectolitre of capacity. It was found that the legal yield did not correspond with the reality, owing to the constant improvement or changes in the manufacture and apparatus, which enabled more roots to be worked. Therefore, ever since 1877, the Government had had the intention of proposing to the Chambers that the duty should be levied on the finished product, or on the density of the juice; but the idea had not found much favour among the manufacturers, nor was it at first well received by the public. It was therefore found necessary, in 1878, to fix a minimum of receipts of 6,000,000 florins, with a yearly increase of 500,000 florins up to 10,500,000 florins. A new law, in 1880, fixed the minimum at 10,500,000 florins, with a yearly increase of 400,000 florins, and modified several important points of the old law. This gave some good results, but the inconveniences of the system soon reappeared. Public opinion changed, and even the manufacturers themselves

began to complain of a system which compelled incessant and costly changes in their machinery, and which created great inequalities between the factories of different districts. The Government therefore submitted to the Chambers a Bill, to take effect on August 1st, 1888. This new law abandons the old system, and takes the actual production as the basis of the duty. Exported sugar will be free from duty. Austria considers this the most equitable system. No other could offer the same advantages or give equivalent guarantees for the suppression of bounties. Austria has thus shown herself ready to abolish bounties. It is true that the new law permits a direct bounty, in order to enable the manufacturers to sustain the competition of other countries. But bounties of this kind are more easily abolished than those which are disguised. In conclusion he stated that, duty on consumption being the only effective system, he was not prepared to accept equivalents.

3. M. Guillaume (Belgium) gave an historical review of the Belgian system, which has for its basis the volume and density of the juice. In Belgium the most minute precautions are taken to determine the quantity of juice worked. It is true that a bounty still exists, which arises from the difference between the legal and the actual yield. The Government are ready to make modifications as to this point, the extent of which will depend on the concessions made by other countries. The abolition of bounties could be attained by the Belgian system just as well as by any other. In fact, the Belgian Delegates do not believe that the system of working in bond would offer such complete guarantees. By raising the estimated yield in Belgium the bounty would be abolished. It would be impossible to apply, in Belgium, the system of working in bond, a system which, though the best in principle, is the most difficult to put in practice. The Belgian Government, while retaining its own system, believes that it will thus arrive more surely at the desired result.

In the course of considerable discussion with Mr. Walpole and M. Sans-Leroy, M. Guillaume further stated that the estimated yield ought to correspond with the average of the actual yield; that the minimum of receipts was a matter of little importance; that Belgium had proposed, in the Draft Convention of 1877, to raise the estimated yield to 1,550 gr., and afterwards to 1,600 gr., which would of course involve an increase of the minimum, and that it was ready to make the same proposal again, coupled with a reduction in the rate of duty.

M. Sans-Leroy said that, considering the population of Belgium and the probable consumption of the country, the minimum appeared to be the most evident proof of the existence of a considerable bounty. The Belgian consumption must be equal to the average of the four neighbouring countries, while the legal minimum was, by more than two-thirds, less than the duty, if estimated according to this average. He did not attach any value to the argument put forward by Belgium, that its consumption was less than that of neighbouring countries.

M. Guillaume urged, in reply, that the use of tea and other similar beverages was not customary in Belgium. Moreover the Customs accounts, previous to the introduction of beetroot sugar, showed that the consumption was decidedly inferior to that of neighbouring countries. It was, therefore, in no way surprising that it should still remain so.

Mr. Walpole pointed out that the legal minimum was only equivalent to a consumption of 2·26 kil. per head, whereas the consumption must be at least 6 or 7 kil. M. Guillaume, while contesting this assertion, admitted that the consumption was more than 2·26 kil.

In reply to Lord Onslow, M. Guillaume said that the legal minimum was fixed according to the importations, production, and exports of the last three years. M. Sans-Leroy asked how the quantity really produced could be arrived at, to which M. Guillaume replied that the calculations were made taking account of the fact that the quantities produced exceeded the legal yield. Being further pressed by M. Sans–Leroy as to the consumption in the north of France being 12 kil. per head, and how it was possible to form any idea of the Belgian consumption where there was no proper excise supervision of the factories, M. Guillaume replied that the estimate was based on facts observed in neighbouring countries, and especially on the proportion found in France between the estimated and the actual yield.

4. M. Lange (Denmark) stated that an open bounty was given in Denmark on beetroot sugar exported, which the Government was disposed to suppress. On the exportation of refined sugar the bounty was small, and the export was diminishing. The Danish Government was certainly disposed to enter the Sugar Union which might result from the Conference.

5. M. Dupuy de Lome (Spain) said that no beetroot sugar was produced in Spain, and that although in some districts a little cane sugar was produced there was no exportation. But her colonies had suffered more than any other country from the bounty system. They received no bounty, and, until recently, had paid an export duty. Spain desired the suppression of the bounties, and would earnestly co-operate to bring it about.

6. M. Sans-Leroy (France) admitted that France had formerly applied a system of excise supervision which left no opportunity for abuses, but that she had now adopted the German system in order to enable her industry to sustain the unequal competition. By levying the duty according to the estimated yield of the roots a considerable bounty was granted to the indigenous industry, and the amount of this bounty was accorded in the following year to the colonial sugar. For the present year this colonial bounty amounted to 36·44 per cent., that having been the bounty which the home manufacturers enjoyed during the preceding season. Undoubtedly these were very high bounties, but it was not France that led the way; she only followed the example of others in self-defence. He was not instructed to point out the means of stopping this objectionable state of things, but he would join in any system which would satisfy all the interests engaged in the question.

7. M. Catalani (Italy) had nothing to add to the memorandum furnished by his Government, but was ready to answer questions.

8. M. Verkerk Pistorius said that Holland had from the first heartily seconded the efforts to bring about a Conference for the general abolition of bounties, and his Government hoped to arrive at an agreement which would permit of placing its legislation on a rational and stable footing by putting it in harmony with the reality. Fiscal laws should not be an instrument of protection but a means of supplying the wants of the Treasury; and frequent changes, injurious to industry, should be avoided. Legislation in Holland, as regarded sugar, was not inspired by the principle of protection, but, on the contrary, aimed at a reduction of the bounties. The revenue derived from the sugar duty was a sufficient proof of this, having risen from 2,000,000 florins in 1864, with a duty of 22 florins, to 8,000,000 florins, with a duty of 27 florins. In 1884 the Government hesitated no longer to adopt saccharimetry as the basis of the estimated yield in refining, in place of the system of colour standards, which had proved insufficien

and had led to increasing importations of artificially coloured sugars. This almost entirely suppressed the bounty enjoyed by the refining industry. Since then those refineries which applied any process for the extraction of sugar from the molasses suffered a deduction of 1 per cent. from the allowance made for loss in manufacture. An attempt was made in 1875, according to a new agreement with the Powers signatories to the Convention of 1864, to establish manufacturing and refining in bond, but the Bill was rejected by the Second Chamber on the grounds that the proposed system was too severe for the refineries, and that it was not sufficient that France alone should undertake to adopt the same system. The only serious change which had taken place since then, in the legislation with regard to the beetroot sugar factories, was the adoption of a supplementary tax in the case of those which applied processes for the extraction of sugar from the molasses. The estimated yield, fixed in 1867 at 1450 gr. of refined sugar, or 1647 gr. of raw sugar per hectolitre of juice and per degree of density, had remained unaltered, although the industry had made great progress. The reason for this was that the Government did not think it right to propose a measure which, though placing the legislation on a more rational basis, would expose the industry of Holland to the competition of foreign industries enjoying constantly increasing bounties. He hoped that, thanks to the initiative taken by Great Britain, this last obstacle was about to disappear, and he assured the Conference that the Cabinet of the Hague would be happy to co-operate in the proposed task of suppressing, in conjunction with the other Powers assembled, the bounty on the production of sugar. He pointed out that the industry of the Dutch Colonies, which enjoyed no protection, had suffered cruelly from the crisis of 1884, caused by an excess of production, and provoked indirectly by the protection accorded to the sugar industry of Europe. The Dutch refineries, left to their own resources since that date, had found great difficulty in sustaining the competition. Under these circumstances, the Dutch Government would readily agree to any international agreement which would put a stop to this protection. He was himself disposed to adopt, for the refineries as well as the factories, the system of working in bond, if the other Powers would do the same. He thought that it would be necessary to consider also another kind of protection, arising from the advantage which exportation derived from the heavy import duties levied in some countries. His Government considered this side of the question very important, and one which should enter into the deliberations of this Conference as it had into those of all the preceding Conferences.

In reply to questions M. PISTORIUS said that identity of *régime* had great advantages, and in his opinion the Conference should seek for a solution equally applicable to all countries. At the same time he did not refuse to discuss equivalents.

9. M. KAMENSKY said that in Russia the duty was simply levied on the manufactured product. There was, therefore, no trace of any hidden bounty on exportation; the drawback was identical with the duty. A direct bounty had been temporarily given at a moment of crisis. It was 11 fr. 18 c. per 100 k., but it had been abolished on the European frontier, and continued on the frontier of Asia only till 1891. After that date the bounties would be altogether abolished. The exception with regard to Asia was justified by the fact that special sugars were required for Asia. The Russian system was a good one, and secured for the revenue the sum of 46,000,000 francs.

M. SANS-LEROY said that the Russian Government had permitted the manufacturers to form a syndicate and artificially raise the price in the home market, on condition that they would export a certain portion of their production at a low price. He had been assured by the Minister of Finance that this should not occur again, and he asked M. Kamensky to confirm this assurance. M. Kamensky willingly confirmed this promise.

10. M. DICKSON stated that no drawback was allowed on the exportation of beetroot sugar from Sweden. On refined sugar made from imported raw sugar the drawback was the exact equivalent of the duty levied. So long as that remained the case, the existing law secured the suppression of bounties.

COUNT DE KUEFSTEIN wished to add that the new project of law in Austria fixed the amount of bounty at 5,000,000 florins, so that instead of a minimum of receipts, Austria would fix a maximum of bounties.

THIRD SITTING.

The PRESIDENT expressed satisfaction at the unanimous feeling in favour of the abolition of bounties. German legislation already tended towards the abolition of bounties, and Germany was fully disposed to abolish them if the other Powers would do the same. Austria had already prepared a law which furnished the means of abolishing bounties, sugar destined for exportation being free from duty. It was evident that Austria would willingly abolish the bounty. Belgium had made reserves as to the means to be adopted for the suppression of bounties, but accepted the principle of their total abolition. The modifications to be made in her legislation would depend on the concessions made by the other Powers. If the bounties were entirely suppressed in the other countries Belgium undertook to find the means of suppressing hers. Denmark, Italy, and Sweden would evidently find no difficulty in entering the Sugar Union which it was hoped would result from the present Conference. Spain practically gave no bounties, and greatly desired their suppression in other countries. France gave very large bounties, but did so only in self-defence. She declared this state of things to be injurious, and would not hold aloof from a Union which would restore the balance of European interests engaged in this question. The Cabinet of the Hague would be glad to co-operate in the work by abolishing the bounty in Holland, provided that it should disappear in the other countries. In Russia the duties were levied on the manufactured product. The drawback and the duty were identical. A bounty had been temporarily given, but the Conference had been assured that this would not occur again, at all events on the frontier of Europe. There was, therefore, a complete agreement as to the desire for the suppression of bounties. It was now necessary to take steps unitedly for the realization of this suppression. Several Delegates had declared that they were not in a position to indicate the means by which their respective Governments proposed to put a stop to bounties, although they were quite disposed to do so. He therefore asked whether any one had a general proposition to submit to the Conference, which might furnish a basis for a uniform legislation in the various countries.

M. VERKERK PISTORIUS proposed to begin by seeing whether the Powers disposed to accept duty on consumption could be got to agree to a system of refining in bond. Several Powers had proposed measures in this direction. It would be necessary in the first place to see whether one of these measures would serve as a basis of discussion.

The PRESIDENT thought that instead of entering on a technical discussion it would be better to refer the matter to a Commission which should report to the Conference.

In the course of conversation on this point M. Pistorius said that he wished to reserve the question of equivalents. He had spoken of the system of working in bond *(entrepôt)* because that system appeared to meet with the adherence of the greater part of the Delegates, but the question of equivalents should be reserved.

M. Sans-Leroy thought there was a question which should come before the one proposed to be referred to the Commission. It was necessary, in the first place, to decide the contested point, how to estimate the saccharine value of the products submitted to duty. Agreement on the system of assessment would be of no value without first determining what was the object which the duty should strike.

The President thought that the Commission might have this question referred to them.

Mr. Walpole said that with the system of duty on consumption the duty would be levied on the finished product, which would dispense with all calculation and all presumption of yield.

M. Sans-Leroy thought it would be necessary to determine accurately the nature of the dutiable article *(la matière imposable)*. He was in favour of excise supervision *(exercice)*, and believed that it could nowhere be carried on under better conditions or so easily as in France. But they did not consume pure sugar only. It was therefore essential that the duty should be levied on a saccharine richness ascertained by a method universally adopted. It was necessary to be agreed as to the value attributed to this expression of saccharine richness. He urged that this question should be decided before the one which the President proposed to refer to a Commission.

M. Pistorius did not take this view. He thought that the question of saccharimetry would vary in importance according to the system of duty which might be adopted. If it were duty per degree saccharimetry would take a leading part. If it were the system of excise supervision proposed in 1877, with estimated yield and levying of the greater part of the duty on the sugar entering the refinery, saccharimetry would again take an important part. But if the system of refining in bond were adopted, depending entirely on supervision on delivery, its *rôle* would become altogether secondary, because it would confine itself to determining, as a means of control, the quantity of absolute sugar entering the establishment, and the richness of the after-products. The question raised by M. Sans-Leroy appeared therefore to be one for the Commission.

M. SANS-LEROY thought it would be necessary to determine the richness of the raw sugars on their delivery from the beetroot factory.

The PRESIDENT thought the difficulty could be got over by referring both questions to the Commission.

COUNT DE KUEFSTEIN asked whether entering the Commission would involve any obligation or engagement.

The PRESIDENT replied that it was quite understood by all the Delegates that they did not commit their Governments to any engagement.

M. SANS-LEROY said that the Delegates had been sent to present to their Governments a draft project, and that the Governments reserved to themselves to accept or reject it, to submit it to their Legislatures or not. He again urged that the question of saccharimetry should be taken first. The determination of the richness should be the starting point of the Commission.

Mr. WALPOLE thought that the Commission could study first the point raised by M. Sans-Leroy, and afterwards that raised by M. Pistorius, and make its report on the two together.

M. PISTORIUS agreed to this, regarding the first as a means, while the second was a principle.

M. SANS-LEROY desired, more than any one, the system of excise supervision; but it was first necessary to define the article subject to duty.

COUNT DE KUEFSTEIN regarded duty on consumption as a means of avoiding analysis. He admitted that under the new Austrian project of law it would be necessary to employ saccharimetry, but solely in order to allot the direct bounty. The law levied no duty on sugar destined for exportation; there would, therefore, be no return of duty, and consequently no necessity for saccharimetry directly the bounties were abolished.

The Commission was then appointed, Mr. Kennedy proposing Messrs. Jaehnigen, Count de Kuefstein, Guillaume, Sans-Leroy, Verkerk Pistorius, and Walpole.

FOURTH SITTING.

In addition to the Delegates already enumerated, Mr. White, First Secretary of the United States Legation, assisted as informal represenative of the United States.

COUNT DE KUEFSTEIN read the Report of the Commission appointed at the last sitting. The report stated:—

1. That as to manufacturing and refining in bond, the Delegates of Germany, Austria, France, Great Britain and Holland recommended a system of duty established on the quantities of sugar produced and destined for consumption, as the only one which could lead to a total suppression of bounties on exportation. Factories of glucose or for the extraction of sugar from molasses should be subject to the same system.

"Belgium, not finding herself under the same conditions, as regarded the application of the system of duty on the quantities produced, the Delegate of that country made every reserve on this subject. In other respects, he concurred in the principle of the total suppression of bounties on exportation."

2. As to the *rôle* which saccharimetry should play in the system of duty on the quantities of sugar produced, the Commission confined themselves to recommending uniformity of method. As to determining the extent of its *rôle*, this should be reserved for examination at a later period, when the Governments should have made known their views.

3. It was suggested that the Governments represented should be requested to state within a certain time whether they adhered to the above principle. If they replied in the affirmative they should formulate and communicate a scheme indicating the basis on which the system of duty on the quantities of sugar produced should be applied. This scheme should mention in what case and within what limits saccharimetry should be employed. The Governments should make known, at the same time, whether, to secure uniformity, they would be disposed to adopt the French method, as the one in general commercial use. Each Government would then send to the British Government its views as to the communications it had received.

M. Jordan (Germany) had no objections to make to paragraphs 1 and 2, but desired again to state that he was not in a position to accept or reject the conclusions of the Commission. He could merely recommend them to the consideration of his Government. As to paragraph 3, he did not clearly understand its drift. It would be better for one Government to serve as intermediary for the communication of the views of the Governments represented. The British Government would appear most fitted to discharge this office.

This was agreed to.

Some discussion followed as to the necessity for a fixed date on which the Governments represented should communicate their adherence to the principles laid down in the report of the Commission. The Delegate of Germany was opposed to the fixing of a date. Finally the 1st of March was fixed, M. Jordan renewing his reserve on the point. The following resolution was also agreed to:—

"It shall be stated in the *Procès-verbal* that the Government of Her Brittanic Majesty is requested to take the necessary steps with the other Powers to carry out the recommendation contained in the third paragraph of the Report of the Commission, and to undertake the exchange of schemes and of the criticisms to which these schemes may give rise."

M. KAMENSKY (Russia) then spoke at some length with the view of showing that the system of duty on the quantity of sugar produced, recommended in the first paragraph of the Report of the Commission, need not be applied in Russia, or in Austria after the application of the new law, because in those countries the duty will be levied on the manufactured product, and therefore there can be no hidden bounty. A complete excise supervision existed in Russia, and if any defects could be pointed out in the system he would be glad to indicate them to his Government.

COUNT DE KUEFSTEIN quite agreed with M. Kamensky that duty on the manufactured product was the only means of accurately levying the tax. He pointed out that it was not correct to say that under that system the drawback was exactly equivalent to the duty, because, in fact, there was no return of duty, the tax being levied only on the sugar destined for home consumption. That was precisely the principle of the system of manufacturing in bond.

M. DICKSON said that as Sweden did not export sugar, and was never likely to do so, there was no necessity to adopt the system of manufacturing in bond in that country.

The report was then adopted with the proposed addition.

M. GUILLAUME then gave a long explanation of the reserves which he had considered it his duty to insert in the report, and of the compensations which Belgium was disposed to offer instead of the guarantees resulting from the system of duty on the manufactured product. After claiming for Belgium the honour of originating the idea of the suppression of bounties on the exportation of sugar, M. Guillaume declared that manufacturing in bond was "impracticable in Belgium," and that the Belgian nation had an antipathy to such a system, it being a country in which "absolute liberty reigned." In all the previous Conferences an exception had been made in favour of Belgium. M. Guillaume then proceeded to examine what equivalents he could offer. It would be difficult to abolish the duty while the duty on other articles of large consumption was maintained. If all the producing countries could adopt that course the matter would assume a different aspect, but that was evidently out of the question. He thought that an equivalent could be found by maintaining the present system and raising the estimated yield. The bounty in Belgium arose from two causes, the lowness of the estimated yield and the frauds which had been committed for many years. Fraud having now been rendered impossible, it was only necessary to consider the other point. Mr. Walpole had said that the legal (apparent) consumption in Belgium was only 2½ kil., an amount very much below the reality. But it was only during the last few years that it had descended to this point, and that was owing to the frauds of which he had spoken. If the average of the five years preceding the campaign 1885-6 were taken it would be found that the consumption was nearly 3½ kil. per head. Frauds being now got rid of, this figure must be the starting point for ascertaining how much the estimated yield should be raised in order to remove the difference between the legal and the actual consumption. M. Guillaume put the true figure at a maximum of 5 to 6 kil. per head, which would give a consumption of 31,000,000 kil., or 12,000,000 above the legal consumption, apart from the quantities which escaped duty owing to fraud during the last few years. By adding this 12,000,000 kil. to the estimated yield the true consumption would be reached, and all bounty suppressed. The estimated yield should, therefore, be raised from 1,500 to 1,700 grammes. In case of osmose being used this figure should be raised to 1,802 grammes, or with the separation process to 1,836 grammes.

Count de Kuefstein feared that these equivalents would not be satisfactory. M. Guillaume's calculations were purely hypothetical and could not offer guarantees of sufficient accuracy.

The President thought that all the Delegates would share Count Kuefstein's views. All that could be done would be to refer the offer of Belgium to their respective Governments.

M. Guillaume thought that the Conference would create an unfortunate situation if it rejected a system of estimated yield which, in his opinion, would give a legal consumption representing exactly the real consumption. If Belgium remained outside the projected arrangement she could not carry out so complete a suppression of bounties; and her bounty-fed sugars would create a serious competition with those of the contracting countries.

M. Verkerk Pistorius did not think that Belgium would arrive at the suppression of bounties in the way indicated by M. Guillaume. An estimated yield must always leave advantages to some of the manufacturers. Those on the borders of Holland would certainly have considerable excess yields even with an estimation of 1,700 grammes. This would not, therefore, be an equivalent for what Holland offered, namely, the complete abolition of bounties.

M. Guillaume admitted that there would be a gain for those who had high yields, and a loss to manufacturers with inferior yields, but that was not a matter which interested the Conference, which only had to consider whether the sum total of the sugar was subsidized.

M. Verkerk Pistorius could not accept this view. Dutch manufacturers would find themselves in competition with those of Belgium who realised yields above the legal yield. This falsified the condition of competition. If Holland "sacrificed" the advantages which her manufacturers enjoyed to-day, it was just that Belgium should do the same.

M. Guillaume remarked that Belgium could not be asked to raise the estimated yield to the maximum.

M. Verkerk Pistorius replied that hence it was evident that bounties could not be abolised by the means proposed.

M. du Jardin (Belgium) observed that the absolute could never be attained. There would always be fissures.

M. Guillaume thought that if Belgium did what she could, it being admitted that excise supervision was impracticable, more could not be asked of her.

M. Walpole thought that Belgium would more readily bring about the acceptance of the equivalents she proposed if she could prove unmistakeably that she could not accept the general agreement. But it was well known that the Belgian manufacturers had themselves demanded the application of excise supervision, and that a Parliamentary Commission had adopted it.

M. Guillaume admitted the fact, but added that every Minister of Finance had declared that it could not be accepted at any price.

Moreover, it was a mitigated supervision which left the door open to fraud. It was the general views and interests of the country that should be considered, and not the demands of a few interested parties. In the preceding Conferences the impossibility of Belgium establishing excise supervision had been recognised, since the equivalents offered had been accepted.

Count de Kuefstein pointed out that only four countries were then represented, and that now the position was entirely different.

The President thought that, as the report had been received, it would be well to accept also M. Guillaume's explanations on the same conditions, namely, *ad referendum.*

It was agreed to postpone further discussion on the propositions of the Belgian Government.

Fifth Sitting.

M. Sans-Levoy asked whether M. Guillaume's proposals were definitive, or whether they were to hope for larger concessions.

M. Guillaume said he could not go further. The suppression of the bounty rendered unnecessary any modification of the tariff. Nevertheless, he had indicated that it would be reduced from 45f. to 30f. He had received a telegram authorising him to make a further reduction to 25f. This was not done from the point of view of the suppression of bounties, because the bounties would disappear with the raising of the estimated yield, but from a spirit of conciliation.

M. Sans-Levoy said it was his duty to make every reserve as to the attitude which his Government might find it necessary to take with regard to this question.

M. Verkerk Pistorius concurred with M. Sans-Leroy. He could not admit that an estimated yield of 1700 grammes would abolish bounties. In Holland it was found that an average yield of 1900 grammes would be necessary. He also pointed out that, at the Conferences of 1875 and 1877, Belgium had offered to reduce the duty to 22·50f., and even to 19f. when the revenue exceeded 4,800,000f. There was also another point raised at that time. Belgium still applied the system of colour standards to the imported sugar, a system which had been condemned as absolutely insufficient for appreciating the value of a sugar. It also lent itself to considerable frauds, as had been proved in Holland. This question was of great importance to Holland with regard to the refineries. He doubted whether his Government would agree to any arrangement which maintained this mode of estimating yields.

M. GUILLAUME declined to accept the figures of M. Pistorius as regarded the yield in the factories. As to the question of colour standards, it had been admitted, in 1875 and 1877, that it had no importance in respect of cane sugar. This, however, was a secondary question.

The PRESIDENT, while appreciating "the sacrifices" already made by the Belgian Government, thought that the other Powers did not consider that they offered sufficient guarantees for the abolition of bounties.

M. GUILLAUME thought that the figure of 1,700 grammes might be raised in the future, if it were found necessary. He did not regard working in bond as an insurmountable obstacle to fraud if it were connived at by the officials. As to the bounty on refining in Belgium, it was trivial. The great question was the bounty on production, and it was not certain that the system of working in bond might not, by the negligence or weakness of the officials, give rise to larger bounties than those which might continue in some of the Belgian factories.

M. SANS-LEROY pointed out that though the Belgian refineries were of no great importance at the present time, they might easily become so if, under the terms of a Convention, certain advantages were allowed to Belgium. He thought further discussion useless, and only hoped that the negotiations which would be carried on after the sittings of the Conference might result in a satisfactory agreement.

M. DUPUY DE LOME (Spain) said that as the views of the Conference were about to be formulated for submission to their respective Governments, the moment had arrived for raising what appeared to him to be a very important point. He desired to speak of the sanction which could be attached to the clauses of the future Convention, or, in other words, the guarantees which could be given to the contracting countries. Spain had suffered perhaps more than any other country from the bounties. On account of them she had almost entirely lost the English market. It appeared to him that to the question of bounties was very intimately connected the interpretation of the clause which, in the Commercial Treaties, secured for the contracting parties the treatment of the most favoured nation. In what way had the bounties reacted on the trade of the Spanish Colonies with England?

Suppose there were, for instance, on the London market, German sugars enjoying a bounty, and Spanish sugars deprived of any similar advantage. The situation of these products was exactly the same as if the Spanish sugars had been charged, on their importation, with a duty equal to the bounty enjoyed by the German sugars. To permit bounty-fed sugars to enter on the same terms as sugars receiving no bounty was in reality to strike the latter with a differential duty. Was not this an infraction of the most-favoured-nation clause? He thought that this question could not be passed over in silence. He did not desire that it should be immediately discussed, but he wished his observations to be put on record.

M. Sans-Leroy declined to discuss a question which had not been contemplated in the programme of the Conference.

M. Jordan and Count Kuefstein concurred in this view.

M. Dupuy de Lome thought that the question raised by him came within the scope of the Conference, more especially as the fourth paragraph of the circular of the Marquis of Salisbury anticipated the examination of various propositions which might be made with the view of inducing the Governments to suppress bounties. For the moment he desired only to state his views. But the sugar question had become so important, and the fiscal measures taken by certain Governments had given rise to such serious consequences, that it did not appear possible to conclude a treaty without inserting clauses of guarantee. The time had not arrived for entering on the discussion of this point, but he thought it necessary that the Governments should examine it before the Conference resumed its deliberations, so that the Delegates might return to London furnished on this point with the necessary instructions.

The President said that at the moment when M. Dupuy de Lome made the important declaration to which they had just listened, he had been about to announce the intention of his Government to submit a draft Protocol, to which would be annexed a draft Convention. These documents were being printed, and would be distributed on the following day. There was no mention of a penal clause, but his Government would be happy to present, on this matter, the opinion of the Delegates before they separated. If the Spanish Delegate would give to his views a definite form in writing, his motion, printed and distributed as an annex to the draft Convention, could be considered at the next sitting.

M. Sans-Leroy thanked M. Dupuy de Lome for raising this important question, and thus guarding by anticipation against difficulties which might arise unexpectedly.

M. DUPUY DE LOME repeated that bounties falsified the conditions of competition which it was the object of the most-favoured-nation clause to equalise; that to admit bounty-fed sugar without a countervailing duty was the same as imposing a surtax on sugar that was not subsidised; and that, therefore, every bounty given by the exporting country should be met by a measure of defence on the part of the importing country.

M. KAMENSKY thought that if the agreement between the Powers was completed, the motion of M. Dupuy de Lome would be unnecessary.

M. SANS-LEROY pointed out that all countries were not represented, and that of those represented some might be found dissentient.

M. BALANERO thought that the motion of his colleague, which was made with the view of assisting in bringing about an agreement, raised a question of general interest, and deserved to be studied not only with regard to sugar but also from the point of view of trade as a whole.

M. VERKERK PISTORIUS desired to revert to the question of surtaxes which he had raised at the second sitting. By surtaxes he meant the difference between the duty which was paid on the national sugars and that which was levied on foreign sugars. It was, in fact, the question of customs duties between the contracting countries. In the Conventions of 1864 and 1875, and in the draft Convention of 1877, it was expressly stipulated that these surtaxes should not be levied. It was, in fact, understood, to use the words of M. Tiesserenc de Bort, "that the reciprocal opening of markets was one of the conditions of the conventional *régime*." It could not be better put, and when the question of abolishing bounties was raised it appeared impossible to leave on one side the question of surtaxes. This was confirmed by the fact that in most countries surtaxes were adopted in order to combat the effect of bounties. That was the motive for the surtax of 10 per cent. in Belgium, now increased to 15 per cent. The relation of surtaxes on the one side with bounties on the other was well defined by a Belgian orator during the discussion of the law of 1884:—

"What was a surtax?" asked, on that occasion, M. Puissant; and here was the reply:—"It was a restitution at the frontier of the bounties which certain countries accorded to their manufacturers to enable them to export their products." "It was not protection," said the Minister of Finance, "it was compensation;" and he added that "it was necessary to reply to bounties on exportation by surtaxes on importation." And, in a letter addressed by the Minister of Agriculture to the Society of Sugar Manufacturers, it was admitted that the result of the surtaxes was to re-establish on the frontier the level of exchange, broken by favourable drawbacks and other bounties given by neighbouring Governments to their people. This being so, it was only logical to suppress surtaxes when bounties were suppressed. It could not be expected that Holland, an exporting country, would withdraw the means of securing an outlet for her industry so long as other States, importing countries, maintained their defensive position. It might be replied that surtaxes were intended to protect the national industry on the home market, and that in this respect there was no difference between sugar and other products. But to this he would reply that it was not a question of making a treaty about other products, and therefore every Government was free to do as they pleased with regard to them; but this was not the case with regard to sugar so soon as it became the object of a special treaty. That surtaxes entered into the programme of the Conference could not be doubted, seeing that they not only acted as a protection on the home market, but also, in a certain measure, had the effect of export bounties. If manufacturers were enabled, by means of a surtax, to dictate prices in their own market, they were in a position to sell cheaper in other countries. Belgium was an illustration of this. The refiners of that country had been enabled, by the surtax of 1884, not only to monopolise their own market, but to increase their production so much that the exportation of refined sugar had already made considerable progress. Since 1884 the importation of refined sugar into Belgium had fallen from 6,442,862 kil. to 1,038,597 kil., while the exportation had risen from 6,447,200 kil. in the first nine months of 1885 to 11,611,000 kil. in the corresponding period of 1887. M. Pistorius concluded by proposing that the question should be examined whether the suppression of surtaxes, as between the contracting countries, should not be considered as an inevitable corollary to the suppression of export bounties.

After some conversation the subject dropped.

SIXTH SITTING.

The Spanish Delegates put in the following note :—

Proposition of the Spanish Delegates.

"The Spanish Delegates think that the Conference should not limit itself to the abolition of bounties; it should also seek a guarantee of this abolition.

"Spain has suffered much from the system of bounties, having lost almost entirely, among others, the British market, being unable to compete against the subsidised sugars. The Spanish Delegates consider that bounties are practically equivalent to the imposition of a differential duty in a third market; they doubt whether the most-favoured-nation clause is justly applied in countries which admit, under the same conditions, products which are subsidised and those which are not. They even think that it will be impossible in the future to make Treaties of Commerce without a guarantee against bounties.

"Without desiring to give to this statement the weight of a formal proposition, they think, nevertheless, that it would be very important that the Delegates should submit these ideas to their respective Governments in order to consider the position which should be given in all markets to sugars from countries which give no bounties, and to those from countries which give bounties.

"In pursuance of these ideas, they propose that the High Contracting Powers should consider whether it would not be desirable to decide that the nations forming the Sugar Union should undertake to prohibit the importation of sugars from countries which give bounties, or to levy a countervailing duty which should not be less than the amount of the bounty."

The PRESIDENT submitted to the Conference a draft Protocol, accompanied by a draft Convention.

M. JORDAN urged that the Protocol should be worded so as to indicate that it emanated from the initiative of the British Delegates.

M. DUPUY DE LOME, after some discussion, pointed out that the President presented the drafts as President of the Assembly and not as British Delegate. It was for the Conference to discuss the drafts, and to decide whether the President had rightly rendered the ideas which prevailed during the discussion.

At the instance of Count de Kuefstein, certain modifications were agreed to in the wording of the Protocol to meet these scruples and to facilitate a general agreement.

M. KAMENSKY wished to insert that in Russia the system of working in bond was unnecessary, because the existing *régime* gave every necessary guarantee.

M. SANS-LEROY pointed out that it was the very system of working in bond which was in force in the Russian factories, excise supervision and working in bond being almost synonymous terms.

M. PISTORIUS concurred with these observations, and said that the Russian system was the very one which they wished to see universally adopted.

M. SANS-LEROY added that the only difference between excise supervision *(exercice)* and working in bond *(entrepôt)* was that the former meant that the product subject to duty was followed during all its transformations, while the latter confined itself to taking note of what entered and left the factory. Russia possessed both systems.

M. KAMENSKY declared himself satisfied.

It was arranged that the British Government should communicate to all the Governments not only the various drafts which might be furnished, but also the criticisms to which they might give rise.

The draft Protocol was then adopted.

Article III. of the draft Convention was then discussed.

M. VERKERK PISTORIUS pointed out that it attributed to the Delegates an opinion which they had never expressed, namely, that Belgium did not find herself under the same conditions as the other countries with regard to the system of duty on the quantity of sugar produced. A simpler and more accurate way of indicating the situation would be to say that all the Delegates, with the exception of the Belgian Delegates, were agreed that working in bond was the only means of abolishing bounties. Hence it would be more logical to suppress Article III., leaving the Belgian Delegates to make their reserves in the Protocol. He could not admit that the reserves of a single country should be formulated as an Article of Convention.

M. DU JARDIN (Belgium) remarked that if the Article disappeared, Belgium would appear to be excluded from the negotiations before the Governments had had the opportunity of pronouncing an opinion as to the value of the equivalents offered by Belgium. There could be no objection to maintaining the Article, seeing that the Delegates had already confined themselves to submitting the draft Convention to their Governments without recommending its adoption.

M. SANS-LEROY agreed with the view expressed by M. Pistorius. It was hardly logical that an Article of Convention should be submitted for examination which was inacceptable to the great majority. But it was possible that Belgium had made it a condition of taking part in the Conference that her system should not be changed. It would, therefore, be an act of deference to the Belgian Government to allow the wording to remain, but to make all the necessary reserves. He formulated his protest as follows:—

"The French Delegates, considering that the system proposed for Belgium does not offer the guarantees for the suppression of bounties which the High Contracting Parties ought to secure, make the most express reserves with regard to Article III."

M. PISTORIUS thought that it was not sufficient to confine themselves to a simple mention in the Minutes, but that these reserves should be made in the Protocol. With this addition, the Delegates of Germany, Austria, Spain, Italy, Holland, and Russia concurred with the reserves formulated by the French Delegates. The Delegates of Belgium, Denmark, and Sweden accepted the Article without reserve.

On the question of surtaxes, raised by M. Pistorius, the Delegates of Belgium suggested, as a compromise, the following article:—

"No new surtax shall be established on sugars imported from one contracting country into another. The existing surtaxes shall not be increased."

The insertion of this article would lead the different countries to state their opinion on the question.

M. PISTORIUS could not agree to a resolution of the question which should involve the maintenance of existing surtaxes.

M. DU JARDIN replied that he preferred the resolution proposed by M. Pistorius, and only suggested the other in case an agreement could not be come to on the proposal of M. Pistorius.

M. SANS-LEROY understood the necessity of avoiding irritating questions; but there were some points on which it was well to anticipate the opinion of the Governments, so as to avoid a disagreeable surprise. It did not appear to him possible to obtain from all the Governments an engagement to establish no surtax.

M. DU JARDIN feared that the Belgian Chambers would not accept a Convention which permitted the contracting parties to levy any surtax on sugar coming from a Signatory to the treaty.

M. SANS-LEROY said that, in the discussion of the law of 1886, the French refiners had declared that they would willingly abandon the surtax on refined sugar if that on raw sugar could be suppressed. He was, therefore, guided by the desire to facilitate an agreement, and not by the idea of defending an advantage which the principal parties interested were ready to give up.

M. DU JARDIN could not understand how a Convention could impose obligations without according any advantage.

M. SANS-LEROY did not think it possible to get every country to forego the right to reserve to their producers the home market.

M. KAMENSKY agreed with this view, and thought that Russia would not abolish the surtaxes.

M. DUPUY DE LOME thought that the question should not enter into the programme of the Conference. Spain had always retained the home market for the sugar of her colonies.

M. JORDAN reserved the question for the consideration of his Government.

COUNT DE KUEFSTEIN thought the question required further study.

The article proposed by the Belgian Delegates was not agreed to, and the subject dropped. The other articles were agreed to, the date being left in blank.

SEVENTH SITTING.

It was agreed that the reserves formulated by Holland with regard to the surtaxes on importation, and by Spain with regard to the means of defence against the importation of subsidised sugar, should not appear in the Protocol but should remain inserted in the Minutes.

The PRESIDENT stated that, on reference to the despatches which had passed on the subject, it was found that Belgium had from the first announced that her Delegates would not be authorised to accept the principle of duty on consumption. The British Government, having accepted this conditional adhesion, could not now express an opinion on the reserves formulated with regard to it by several countries.

The Protocol was then signed, and the President and Vice-President made the farewell speeches which have been already published. These, together with the Protocol and draft Convention, will be found at pages 13-16 of the *Sugar Cane* for January.

THE YARYAN.

A NEW EVAPORATOR.

The following letter from Mr. H. Garnett is taken from the Demerara *Argosy*, of January 7th, 1888:—

The Yaryan, so named after its inventor, was first heard of in connection with sugar about the beginning of 1887; towards the end of the year most of the patents were disposed of at very remunerative figures. Mr. Yaryan holds the patent for America and is one of the syndicate who bought it for Europe. Mr. Stillman, of the Boston refinery, secured the patent for Cuba, and Messrs. Mirrlees Watson & Co. that for the British West Indies.

The apparatus, say a triple, looks exactly like a small horizontal Rillieux plant; each body is something like a heater except that at each end, next to but outside of the tube-plate, are brass castings with chambers in them; the object of these chambers or recesses is to couple one pipe with the other and so run the liquor several times the length of the machine. If bends were used for this purpose they would have to be permanent, which would render cleaning difficult; by removing these castings you have just an ordinary heater and can clean the tubes in the usual way. The liquor runs through five lengths of tube; each five tubes or coil, as it is called, contains 45 square feet of heating surface, and most of the machines in Louisiana are twelve coil machines; that is to say, each body has 540 square feet of heating surface. To start the machine a vacuum of 26 inches is put on all the vessels, liquor is then pumped through the first and steam admitted to the calandria at 5 lbs. pressure. The liquor is pumped through a 2 inch pipe into a "manifold" or distributor; this consists of a 3 inch pipe to which is connected the inlets of the 12 coils; these inlets are throttled down to ⅜ of an inch, the idea being to insure all the coils getting their full supply.

The hot liquor entering a vacuum of 26, at say a temperature of 180° F., boils very violently and flies through its five lengths of pipe like lighting; on emerging from the tube as spray it strikes three dash plates situated in a compartment at one end of the body, here the thicker juice falls whilst the vapour is drawn over into the calandria of vessel 2. The temperature of vessel 1 has now lowered the vacuum there, so that by the time the liquor reaches the 3rd vessel (with a triple) the three bodies have adapted themselves to their rationate temperatures and vacui. Vessel 1 has the highest temperature and least vacuum as the steam is admitted here and it is farthest from the pump; vessel 3 has the lowest temperature and greatest vacuum being nearest the pump and boiled by the comparatively cool vapour from vessel 2. A peculiarity of the Yaryan arrangement is the utilization of the latent heat contained in the condensed vapours. The water from calandria 1 goes to a steam trap, the water from calandria 2 is drawn into calandria 3 by the higher vacuum, and as the temperature of pan 3 is lower than that of pan 2 the heat of the water assists in the boil; from calandria 3 there is a connection to the condenser and through this pipe the vacuum in all the vessels is created when starting; a branch pipe connects to a small pump which draws off the accumulated water in the last calandria. By the time the liquor emerges from pan 3 it has parted with about 75 per cent. of its volume and it is drawn out and pumped to the vacuum pan.

None of the Yaryans that I saw in Louisiana are doing their guarantee, and nearly all of them complain of scale in the pipes; this is not the Yaryan's fault but that of the people looking after them. I saw myself a man try to destroy the vacuum in the first vessel by shutting off the liquor and turning on more steam, the result was what was to be expected—a substantial coating inside the tubes.

At S—— the quotient of the juice entering the Yaryan is 84 and over an experimental run of 42 hours they evaporated 1,400 gallons per hour=33,600 gallons per 24 hours, and their guarantee is 75,000 gallons with 6 lbs. steam on 1st calandria; they, however, only used atmospheric pressure. The juice was going in at 5½° Bé. at a temperature of 174° F. and coming out at 25° Bé. at a temperature of 140° F.

At E—— the Yaryan is a large triple, the concentration actually done is 80,000 gallons of juice from 8° Bé. to 25° Bé. per 24 hours, this against their guarantee of 90,000 gallons water per 24 hours.

The one at Boston is a triple of 1,485 square feet heating surface, and is the only one intelligently worked that I saw. They evaporate 2,200 gallons of water per hour, and concentrated from 7° to 28° Bé. vacuum on the 1st pan 4 inches, 2nd 13 inches, and 3rd 27½ inches; steam on 1st calandria 4¾ lbs. Quotient of juice entering Yaryan 70 to 75. 2,200 gallons per hour is 52,800 gallons per 24 hours; their guarantee was 50,000 gallons. If a plant with such a poor class of juice can do such an enormous duty, there is no reason why a duplicate in Lousiana should not do the same, and even more, as their juice is purer.

To clear the tubes of the Yaryan, water should be put through immediately behind the juice, and once a week a weak acid solution.

On the basis that a boiler is evaporating ·85 gallons per lb. of coal, Mr. Yaryan claims that he can evaporate 2·3 gallons of water with 1 lb. of coal, in a triple, and has done it.

The apparatus is not yet as perfect as it will be. In the first place the upper coils in a large plant do not get their full supply. The same vacuum is in all the coils of 1 body, and as the liquid has more resistance to overcome in mounting to the upper coils, it stands to reason that as the inlets are all exactly the same size, the lower pipes will draw most. In E's case the vacuum in pan 3 has to draw the liquor 7 feet high to the top coil; now, as there is only a difference of 7 inches in the vacuum, it is absolutely impossible that any liquor can be reaching it.

This defect, I should think, could be very easily overcome by putting the various bodies on steps instead of on a level as they are at present made. No. 1 highest, No. 2 lower, and so on, in this way the vacuum would not have to draw anything, and all the coils would get fair play.

Although the Yaryan is quite a new principle, that is to say, a large body of steam deals with a small quantity of liquid to be evaporated, sight must not be lost of the fact, that be the system "Yaryan," "Rillieux," or Multiple effet of any kind, one pound of steam can never evaporate more than one pound of water in a simple effet, and, theoretically, two pounds in a double, three in a triple, and so on almost *ad infinitum*, so that as regards saving in fuel there is no reason that I know of why it should be more economical than a well fixed triple. Of course, there are a number of things in its favour otherwise; you have never a large quantity of liquor in the arrangement, it takes up very little room, requires little or no attention after starting, its working being all automatic, and the price is, I believe, not excessive; at all events, the actual making of the machine can cost but very little.

There are some plants coming to Demerara, so we shall soon see what they can do on our cane juice.

SORGHUM SUGAR EXPERIMENTS AT RIO GRANDE, NEW JERSEY, 1887.

By D. D. Cone.

(From the *American Grocer.*)

I have been making a special study of the New Jersey sorghum sugar experiments for seven years past, and on the 28th of last month went over to the Rio Grande experiment station, near Cape May, to see the result of seven years' work. On the left hand side of the railway, going South, I found an immense failure, and on the right a gratifying success.

The Failure

Presented itself in the form of an immense sugar manufactory, utterly abandoned in the midst of the sugar-making season. It was established seven years ago by Mr. Geo. C. Potts, of Philadelphia; Ex-Senator W. B. Miller, and H. A. Hughes, of New Jersey, and others, at an expense of about $250,000, equipped with the best type of roller mill machinery, and under the best possible management. But the sorghum cane was poor in sugar, and the roller mill, though good of its kind, did not extract quite half of it. The result was inevitable. It failed to pay expenses. The courage of the managers and their money did not, however, fail. The next purchased a German-French diffusion plant, intended for beet root sugar manufacture, and tried to adapt it to sorghum—an utter impossibility. It also failed as have each and every one of the dozen European diffusion plants that have been tested in this country on sorghum and tropical cane during the past twenty years.

Nothing daunted by the second failure, the managers made a third trial. They had all the time been making improvements in cultivation, increasing the yield of sugar per acre, and, to use a miner's phrase, "*they saw*" the sugar in the earth, and knew that with proper machinery, good cultivation, and honest and intelligent management, they would ultimately get it out. Accordingly the roller mill was sold to go to Florida. The immense factory and its huge diffusion plant of European make was abandoned; and a small experimental mill was constructed early this year—in time to work through the present season, and where the costly experience of the past seven years has been utilized—to the advantage, as I shall show, of our domestic sugar industry.

THE NEW EXPERIMENTAL MILL

Is strictly a private enterprise, as was the old manufactory, conducted by ex-Senator W. B. Miller and Mr. H. A. Hughes, General Manager and Special Superintendent of Machinery, independently of either State or national government control, but with the friendly co-operation and advice of Prof. Geo. H. Cook, Director, and Dr. Arthur T. Neale, Chemist of the New Jersey State Agricultural Experiment Station. The State of New Jersey paid a small bounty on the sorghum cane until two years ago, and Congress appropriated about $8,000 in aid of the experiments this season, but neither the State or national government has any control.

The management has followed very much the methods adopted by the first Napoleon in developing the French beet sugar industry. By careful experiments and improvements, both in cultivation and machinery, they have in the course of seven years increased the average yield of dry sugar per acre

ABOUT FIVEFOLD.

Mr. Yung Wing, for many years the Secretary of the Chinese Legation, told me that though sorghum had been grown in China for 2,000 years, for its seed and for fodder, he had never heard of its being used in the manufacture of sugar until he came to this country. It was too poor in sugar and too sensitive to frost. The acclimated sorghum of New Jersey, improved by scientific cultivation, is, however, fully five times richer in sugar than in its native country, and will, moreover, stand severe frosts, thus lengthening, it is claimed, the manufacturing season six or eight weeks. The severe frosts here of October 16 killed sweet potatoes, but sorghum escaped unhurt.

ICE HALF AN INCH THICK

Was formed in the sorghum fields here four weeks before my arrival, and yet I found the Rio Grande works in full blast, even turning out more sugar per acre than ever. One measured acre of sorghum cane worked separately in my presence (October 29), and weighed by Dr. Neale, the State chemist and sworn inspector, yielded 1,970 pounds of first sugar and 112 gallons of molasses. This acre of cane was not exceptional, plenty more equally good and some even better was grown in the neighbourhood.

A dozen measured acres of cane were taken at random from farms in different parts of the county. So there could be no trouble in getting a fair average. The cane of each acre was cut and worked separately, and the sugar weighed under the supervision of Dr. Neale.

The object of the management was to obtain a fair average yield per acre that could be depended upon, rather than an exceptional yield. Had they selected the measured acres from the best farms, they would have surely secured a maximum yield of at least 2,500 pounds of first sugar and 120 gallons of molasses per acre this year, beyond a doubt. This estimate I am confident is not too high. And I am also sure that the maximum yield in New Jersey next year will reach fully 3,000 pounds of first sugar and a proportionate amount of molasses, and in the course of the next five years 4,000 pounds per acre. The experiments here for the past seven years fully warrant this estimate.

Official Record Evidence.

Special attention is called to the following extracts from the Official Report of Prof. George H. Cook, Director of the New Jersey State Agricultural Experiment Station, covering substantially the five years' experiments ending December 31, 1885:—

"The history of the past season at Rio Grande is essentially the same as that of previous years. There has been the same honest effort to reduce working expenses, to discover and avoid wastes, to improve processes, and in brief, to do everything possible to place this huge experiment upon a strict business basis. The success has been quite as marked as could be expected, and at no time in the history of this plantation have its prospects appeared so bright. * * * * *

"At present the mill is the greatest drawback to the sorghum sugar industry; an experiment upon a large scale, published later in this report, indicating that it fails to secure at least one-half of the sugar existing in the cane. A similar record was made in the last annual report of this station.

"That report also contained the results of an experiment showing that diffusers were much superior to mills. Unfortunately, however, diffusion extracts dark-coloured and bitter-tasting compounds from the leaves and sheaths of unstripped sorghum, which make the products almost unsaleable. Superintendent Hughes, therefore, devised a machine by which the cane could be thoroughly and rapidly stripped, topped, cleaned, cut and shredded. His model and plans were submitted to a number of mechanical engineers, whose verdict was that the machine should be constructed, and the past season has been devoted to proving that such a machine is essential to success. * * * * * *"

ONLY THREE HUNDRED AND EIGHT POUNDS OF SUGAR PER ACRE.

"The records of this plantation, for the past five years, show that upon the average seven and seven-tenths tons of unstripped and untopped cane only have been grown per acre, while the average yield of merchantable sugar per ton of cane has not exceeded forty pounds.

"To compete successfully with other sources of cane sugar, therefore, the average tonnage of good cane per acre should be at least doubled, while the quantity of merchantable sugar secured per acre should be increased many fold."

The official record of these experiments shows an average yield for the first five years of only 308 pounds of sugar per acre, while the average yield this season is some 1,400 pounds per acre—an increase of nearly five-fold—while the officially ascertained maximum yield of this season is 1,970 pounds of first sugar and 112 gallons of molasses per acre—over six-fold the average yield of the first five years.

The evidence here presented in favour of sorghum as a great sugar-producing plant is certainly conclusive, and is amply confirmed by those best qualified to know, all reports to the contrary notwithstanding.

THE COST PER POUND OF MAKING CANE SUGAR BY THE DIFFUSION PROCESS.

While the yield of sugar per acre of sorghum cane has been definitely ascertained at Rio Grande, *the exact cost per pound of making it is yet unfortunately a matter of conjecture.* The estimates of chemists and sugar-makers vary all the way from 5 cents per pound down even as low as ¾ cents per pound. I have it from good authority that the present actual cost of manufacturing sugar in Cuba is about 1 cent per pound. In Hawaii, where they have the best macninery in the world, and where two-year-old tropical cane yields 6,000 pounds per acre, the lowest estimated cost of cultivation and manufacturing is 2 cents per pound. At Fort Scott I am informed that the cost during the present season has been a trifle under 3 cents per pound, but they ought to reduce the cost very largely next year, and doubtless will. It is to be hoped that more attention will hereafter be given to this matter of actual cost per pound. It is of the utmost importance.

What Ought to be Done.

It is a great pity that some portion of the many hundred thousand dollars appropriated by Congress for sugar experiment was not sent to New Jersey. The expense of these experiments has been a heavy load for the Rio Grande Company to bear, as I have already fully shown.

Congress cannot do better than to purchase these works and establish a permanent national sugar experiment station. The expense will be small and the benefits to our domestic sugar industry incalculable.

The methods here are certainly good. Facts are ascertained and stated accurately. I had hoped to find something here, showing the lowest cost per pound of cultivating and manufacturing sugar. But from the nature of the experiments, working measured acres separately, it could not be obtained.

More Experiments Necessary.

Giving all credit to the gratifying reports of success in Kansas and New Jersey and far away Java, and the anticipated success in Louisiana, it will be seen that further experiments are necessary—particularly in sugar machinery—to enable sorghum to compete successfully with the semi-tropical cane of our gulf States with its average yield of 3,000 pounds per acre annually and the two-year-old tropical cane with its 6,000 pounds every two years, the average annual yield of tropical and semi-tropical cane being about 3,000 pounds per acre.

The New Jersey station will, beyond a doubt, bring its annual yield of sorghum per acre up to the tropical cane yield, its officially ascertained maximum yield this year being 1,970 pounds of first sugar and 112 gallons of molasses from one acre of 17 tons and 625 pounds of unstripped cane. Cane was grown upon a number of fields that, in the estimation of good judges, yielded 25 tons of cane per acre, but it was not cut and worked by measured acres separately. A fair estimate of the maximum yield in New Jersey this year should be put down at 2,500 pounds of sugar per acre.

The cost of making sorghum sugar must be reduced one-half or two-thirds. The possibility of utilizing sorghum chips for paper-making must be determined. There is a wide difference of opinion among paper-makers upon this point, and no private capitalist is likely to invest $20,000 in the experiment. If the paper-makers cannot use the chips, there ought to be some method of converting them into the fuel. The latter is I know entirely practicable. The cost of fuel in sugar-making can be largely reduced. The water used in the diffusers should be made perfectly pure by filtration. Nothing has been done as yet in utilizing the wastes. The machinery for all these things will be built as soon as there is any demand whatever for it. Builders are already in advance of the demand.

EXPERIMENTS IN JAVA.

I have interesting reports of recent experiments in Java, but have room here only for mere mention. They made the water absolutely pure by filtration before using it in the diffusers. The pure water was found to extract the sugar more readily and more of it. The result was a large reduction of the dilution, and consequently a saving of fuel in evaporation and a better quality of sugar.

The experiments in converting diffusion chips into fuel were also successful. These are the two most important features in the Java experiments. They do not, however, seem to be able to show us how much it costs per pound to make cane sugar by diffusion.

PREPARING CANE FOR DIFFUSION.

A really suitable machine for preparing sorghum cane for diffusion is, strange to say, yet to be put upon the market. Mr. Hughes saw the need of such a machine as early as 1884, but the sorghum sugar-makers generally have not seen the need of it until this season, and consequently none has been put upon the market. Builders as a rule are not in the habit of putting money into machinery that there is no demand for.

There are "expert" sugar chemists now who think that sorghum can be topped, stripped and cleaned by hand, and that a simple cutter is the only machine necessary to prepare sorghum for the diffusers. Mr. Engineer Hughes, in his report for 1885, makes the following statement to the contrary:—

> "One hour's work with thirty men proved conclusively that it would cost $9 per ton to completely remove leaves, including the entire sheaths, from cane by hand. Diffusion upon a large scale with sorghum, stripped by hand, was therefore impracticable."

I should say so. "Impracticable" is the proper word. Hon. Edward J. Gay, of Louisiana, who is high authority on all matters connected with the sugar industry, wrote me to the same effect years ago. It will be seen, therefore, that the machine that will meet all the requirements of the service must not only cut the cane as heretofore, but do five other things besides, and all with once handling the cane as follows:—

1. Strip the leaves and closely adhering sheaths from the cane.
2. Separate the same from the stripped cane stalks and throw them into a separate receptacle.
3. Cut off the seed tops.
4. Separate the seed tops from the cane and deposit them in a separate receptacle.
5. Cut the stripped and topped cane stalks into two-inch sections.
6. Tear the sections of cane into shreds suited to diffusion.

All this is done now partly by hand and partly in two or three different machines. It should be done wholly by one automatic machine and with once handling of the cane. Once put upon the carrier, the leaves and sheaths should come out at one place, the seed tops at another, while the shredded cane should pass directly into the diffusers, all done by machinery.

The machinery now in use is a success as demonstrating the advantages of diffusion, but the cane has to be handled too many times; besides, there is a great waste. All of which makes the sugar cost too much.

The great success, however, of the present season, particularly in New Jersey, where the agriculturist, engineer, and chemist each minds his own business and does not interfere with others, makes it certain that the mechanical improvements, and they are all mechanical, necessary to further reduce the cost of making sorghum sugar will be forthcoming. Further progress and more improvements are however in order. We must not forget that.

AN OLD TRADE CIRCULAR, 1779.

London, September 9th, 1779.

As we were likely to have had a large Quantity of SUGARS at Market this Week, we waited in the Expectation of purchasing at moderate Prices, and to have enabled our Friends to have done the same, but unfortunately we have just received Information of the Loss of GRANADA, one of our principal Islands, which has caused an Advance on Raw Sugar of full 4s. ⅌ Cwt., and as other Islands are likewise in Danger, we don't see a prospect of their being lower, unless the two Fleets now coming Home should all Arrive safe; but this, in the present Situation of Affairs, is more than can be expected.

REFINED SUGARS are very scarce and dear, but will be more Plenty in a Month or six Weeks, and hope cheaper, as many of the Refiners are now at Work, and by that time there will be a pretty large Supply in the Market.—We shall be glad to see you in Town if it suits your Convenience, but if otherwise, shall endeavour to execute any Orders you may favour us with, on the same Terms, and with equal Attention.

We are,

Your obedient Servants,

Smiths, Nash, Kemble, and Travers.

Raw Sugar	53s. to 80s.
Dry Ditto	
Lumps	84s. to 90s.
Single Loaves	86s. to 94s.
Molasses to buy	18s. 6d.
Brown Candy	10½d. and 11d.
Finest Bohea Tea	5s.
Inferior	4s. 10d. and 4s. 11d.
Good Common Greens	7s. 2d. and 7s. 3d.
Currants	51s. 52s. in package.
Raifolis	56s.
Turkey Figs	56s. ordinary.
Belvideras	30s. to 32s.
Prunes	40s.
Rice	38s.
Poland Starch	43s.

DECENNIAL PRICES OF TEA, COFFEE, AND SUGAR,

From the Year 1787 to 1887,

Taken from the Trade Circulars and other Quotations of Joseph Travers & Sons, of 119, Cannon Street, London, E.C.

Year.	Tea.	Coffee.	Sugar.	
		Roasted.	Raw.	Refined.
	Per lb.	Per lb.	Per cwt.	Per cwt.
1787	1/9½--14/-	2/4 — 4/6	50/- — 78/-	54/- —121/4
1797	2/3 —11/-	3/5 — 5/6	68/- —114/-	78/- —186/8
1807	2/10—18/-	4/4 — 5/6	56/- —100/-	54/- —186/8
1817	5/1 —14/-	1/10— 3/4	81/- —100/-	75/- —185/-
1827	3/1 —14/-	1/1 — 2/9	64/- — 80/-	57/- —160/-
1837	2/3 — 8/-	1/3 — 2/1	54/- — 71/-	43/- —110/-
1847	2/7 — 7/-	0/10— 1/10	33/- — 56/-	33/- — 75/-
1857	0/10— 4/6	1/0¼— 1/6	41/- — 61/-	40/- — 70/-
1867	0/6½— 3/11	0/8 — 1/9	25/- — 41/-	27/6 — 53/-
1877	0/7 — 3/10	0/11— 1/7½	15/6 — 36/-	20/6 — 38/-
1887	0/4½— 3/7	1/1½— 1/7	9/9 — 17/6	10/6 — 19/9

The style of the firm in 1787 and 1797 was Smith, Kemble, Travers & Kemble; in 1807 it was Smith, Travers, Son & Kemble; in 1814 it was J. Travers & Son; and since 1819, J. Travers & Sons.

Sugar duties were abolished in 1874.

THE TRADE IN GLUCOSE IN THE UNITED STATES.

From *The Boston Commercial Reporter.*

During the past few years the consumption of glucose has been of such a magnitude that it may well be called one of our important mercantile allies. The public are not generally aware of what glucose is composed of, what it is, etc., consequently, during the week past, one of our reporters has gleaned all information possible in reference to the article which is yet destined to be one of America's leading productions.

Calling on the only dealers in New England, Messrs. Alexander Bros. & Co., of Chatham Street, who have been for many years engaged in the sale of glucose, representing the leading manufacturers, they were only too happy to give the scribe all information in their power.

"Do we handle glucose," said Mr. Chas. Alexander, "I guess we do, and have for the last fifteen years, but what a difference there is in the trade now! When we first commenced handling the article the demand did not exceed four or five barrels per month, and now what is it? why immense! No one can form the slightest idea of it. We are sole agents for New England for the Dureya's grape sugar and glucose, known as the Glen Cove Manufacturing Company, of New York; the American Glucose Company, of Buffalo, N.Y.; the Geneva Grape Sugar Co., of Geneva, Ill.; and the R. and W. Importers of Germany. We sell to confectioners, bakers, syrup makers, preservers and molasses mixers, cotton mills, chemists, morocco leather manufacturers and brewers; we also ship largely to Canada and the Provinces, and why should there not be a large demand for it? Is glucose not the sweetening matter in the corn, just the same as sugar is to the cane? The best quality of glucose is clear, white and pleasant, and used largely by families in griddle cakes, etc., there is no impurity to be found, and it is perfectly nutritious and wholesome, to which the best chemists in the country will testify.

Glucose and grape sugar are the same production, other than the glucose is a higher grade of goods than the sugar, which is a hard substance and not as good.

Domestic glucose is worth from 2¾c. to 4½c. as to quality, and grape sugar 2½c. to 3½c. Imported glucose sells at 4½c. to 6½c. The importer has to pay a duty of 30 per cent ad valorum, and is not considered as good as the domestic, it being made from potatoes, and the price also interfering with the sale. The heaviest glucose is the home made, and can be taken in the hand; in fact it is hard to discriminate between it and molasses except for the colour.

In addition to the above named companies, there is one at Peoria, Ill.; Davenport, Iowa; Kansas City, Mo., and Chicago, Ill. The latter's goods are mostly sugar, and make the finest sugar in the country, containing 80 per cent. of saccharine matter, and is in a granulated form. Upwards of $40,000,000 capital is locked up and invested by manufacturers in these products, and the labour it employs is one of no small importance among our country's industries.

In the United States the manufacture of glucose is of comparatively recent origin, but already the factories for its production employ thousands of people, and represent an investment of not far from $40,000,000, consuming an immense quantity of our great staple, corn, and turning it into glucose (corn syrup), of a quality that is not surpassed by any product in the world.

But, as might have been expected, the introduction into America of this manufacture, so old in Europe, coming in contact, as it inevitably would, with established interests, created alarm and aroused opposition.

BRITISH GUIANA.

Great Opening for some Minor Industries.

In a recent report the United States Consul at Demerara urges his countrymen to establish a steamer line and fruit-growing company in British Guiana, of which he says "the profits must, in view of the magnitude of the trade, be necessarily large." As the opportunity is equally favourable for British merchants and investors, it may be well to summarise the Consul's statements on the subject.

The soil of the colony along the coasts is extremely rich; cocoanuts grow near the shore, and large quantities of bananas may be grown within three or four miles from the sea. The long yellow bananas are in every way superior to those grown in the West Indian Islands, and equal to those of Port Limon and Aspinwall, which are so deservedly popular in the American markets. The first cost of planting an acre with bananas is from £10 to £12, the production being from 600 to 800 bunches a year. The plants mature in nine months, and the fruit can be gathered every week in the year after it is well started.

In Guiana all carriage is by water; hence bananas can be delivered at the steamer in better condition than in any other part of the West Indies, where they are carried by springless carts, on negroes' heads, &c. Hurricanes which decimate the plantations elsewhere do not prevail in Guiana.

Demerara is 2,200 miles from New York; the course crosses the Gulf Stream, which is said by shippers "to cook the fruit" in a much shorter time than that from any other West Indian port; Bermuda and Barbados might be made ports of call to the greatly-increased profit of the voyage. Vessels drawing 18ft. 6in. can enter the

Demerara river at high water. In 1885 bananas to the value of £400,000 were imported into the United States, mainly at New York, New Orleans, Boston, and Baltimore. The cargoes realised from 4s. to 12s. per bunch for the best quality, and it is, Mr. Bunker thinks, highly probable that contracts could be made in Guiana for their delivery alongside at 10d. to 1s. per bunch. A vessel of 1,000 tons dead weight could carry a cargo of 20,000 bunches; the loss on the voyage rarely exceeds 15 per cent., and if the balance were sold at the low price of $1 per bunch, the estimated profit on the trip would be not less than £1400, after payment of all charges. This does not include profit from general freight, passengers, or mails. Cocoa might be cultivated at the same time as the banana, the latter giving the best shade for the young cocoa plants. Banana plants yield an excellent fibre, and the papaw, lime, orange, mango, guava, and pineapple might be added to the cultivation. Guiana being a sugar-producing colony, a trade in canned fruits might be developed.

The climate, the Consul thinks, is much maligned; Guiana is not, as is commonly supposed, a hot-bed of fever; there is little variation in the temperature, and the thermometer giving an almost uniform reading of 84 degrees Fahrenheit. Sea breezes prevail for the greater part of the year; cases of yellow fever are comparatively rare, and may be generally traced to dissipation or indiscretion.

WAGES IN THE BRITISH COLONIES.

A series of valuable circulars has just been issued from the Emigrants' Information Office, 31, Broadway, Westminster, which has been established under the supervision of the Colonial Office for the purpose of supplying intending emigrants with useful and trustworthy information respecting emigration to the British Colonies. We may quote the following brief statement as to the best time for emigrants to arrive in the several colonies dealt with in the present instalment: "Canada—April to middle of July—not the winter months; New South Wales and Victoria—any month, September to November for preference; South Australia—May to October; Queensland—April to October, inclusive; Western Australia—September; Tasmania—Any month, September to November for preference; New Zealand—September to January, inclusive; Cape—Any month; Natal—Any month, August for preference."

With regard to the present demand for labour, the information is thus summarised: "Farmers with capital—a demand in all the colonies; farm labourers—a demand for good men in Canada (after the winter), New South Wales, Victoria, Queensland, Tasmania, and New Zealand; mechanics—little or no demand in any colony; general labourers—little or no demand in any colony; female domestic servants—a good demand in Canada and the Australasian Colonies, and a slight one at the Cape."

Bearing these facts in mind, and turning to the circulars themselves for more detailed information, we find it stated that in Canada blacksmiths who can shoe horses will generally find employment, and late returns from the Government agent at Hamilton, Ontario, show a moderate demand for tailors (machine hands). In this connection a general warning is given that persons should always be prepared to take to other work than that of their own particular trade. The classes especially cautioned against emigration are women above the grade of servants, clerks, shopmen, persons having no particular trade or calling, or otherwise unfit for manual labour. The wages in Canada for those classes at present in demand run as follows:—For farm labourers, per month, with board, from $10 to $20 in the province of Ontario, $15 to $25 in Quebec, $10 to $12 in New Brunswick, $15 to $30 in Manitoba, and $20 to $30 in the North-West Territories. The monthly wages of female farm servants, with board, range from $5 to $12 in Ontario, $6 to $10 in Quebec, $5 to $7 in New Brunswick, $4 to $6 in British Columbia, and $8 to $15 in Manitoba. Female cooks receive per month, with board, from $6 to $15 in Ontario (excepting in Port Arthur, the particulars of which are not given), $8 to $10 in Quebec, $8 to $12 in New Brunswick, $6 to $12 in Nova Scotia, $15 to $30 in Manitoba, and $25 to $45 in the North-West Territories. The wages of female laundresses are on a slightly lower scale, except in Nova Scotia, where the rate is from $12 to $20. In regard to both these classes it is mentioned that few are required in British Columbia, as the work there is done by Chinese. The monthly wages of female domestics, with board, runs from $6 to $10 in most parts of Ontario, and from $12 to $16 in Port Arthur, $5 to $10 in the Eastern Provinces, $15 to $20 in British Columbia, $8 to $18 in Manitoba, and $15 to $30 in the North-West.

In New South Wales the following are the yearly wages for the only classes who are at present in request: Married couples, without children (for agricultural stations), £60 to £85; farm labourers, £30 to £52; cooks, £30 to £65; general servants, £26 to £45; house and parlourmaids, £26 to £35; laundresses, £32 to £52; nursemaids, £26 to £35.

The report relating to Victoria contains this statement: "Although the condition of the colony is improving, there is still little or no demand for the artisan class, especially in the larger towns, but in some of the smaller rising towns the prospects are slightly better." The following is the prevailing scale of wages in this colony: With board and lodging per year—Female cooks, £30 to £50; general servants, £25 to £35; girls, £15 to £20; housemaids, £20 to £30; laundresses, £25 to £35; nursemaids, £15 to £25. Agricultural and pastoral labour: (1) Per week and all found—Ploughmen, gardeners, sheep-washers, 15s. to 25s.; farm labourers, and generally useful men, 15s. to 20s. (2) Per 100 sheep shorn and all found—Shearers, 14s. to 18s. (3) Per year, with board and lodging—Boys, £12 to £26; married couples, £60 to £80; dairymaids, £25 to £30. Farm labourers are usually boarded and lodged, and single men are, as a rule, preferred to married men with families.

Under the heading, "Present demand for labour," in the circular on South Australia, it is stated: "There is no demand for male labour from the outside, and many persons are out of employment. Mechanics and clerks are specially warned against emigrating. Good female servants are always in demand." The weekly wages for female servants, with board and lodging, are thus given: General servants, 8s.; cooks, 10s. to 20s.; housemaids, 8s. to 10s.; kitchenmaids, 8s. to 10s.; house-keepers, 12s. to 20s.; laundresses, 10s. to 16s.; nursemaids, 8s. to 10s.; charwomen, 3s. per day.

From Queensland the report is: "On the whole, there is a decided improvement in the labour market throughout the colony, but there is still no demand whatever for artisan and trade labour. On the other hand, genuine farm hands, if single, or married without encumberance, have no difficulty in finding work. There is not much demand at present in the pastoral industry, but men accustomed to the management of stock will find employment in some districts. Female domestic servants are wanted in all parts." The wages of farm labourers are from 14s. to 18s. a week, with rations. Domestic servants receive per week, with board: Cooks, 12s. to 20s.; laundresses, 12s. to 20s.; housemaids, 8s. to 10s.; nurse girls, 5s. to 8s.; general servants 9s. to 15s.

There is some opening in Western Australia for farmers with capital, and a good demand for female servants. Farmers, however, are advised to get experience of colonial farming before taking up land. With these exceptions the labour market is fully supplied. The wages of cooks and general servants range from £12 to £24.

In Tasmania "there is a good demand for female domestic servants. There is also a demand for agricultural labourers, dairymen, ploughmen, men who are well up in working land, pruning fruit trees, and nursery work, gardeners, &c., but they must understand their work or they will have difficulty in getting places. The supply of mechanical labour in the towns is equal to the demand. Farmers with £200 capital and upwards can do well." Wages are considerably below those prevailing in Victoria.

An even less attractive report comes from New Zealand. "All artisan and mechanical trades are depressed at the present time. In the chief towns the supply of labour is quite equal to the demand. The labour market as regards engineers, carpenters, saw-mill hands, plumbers, and shoemakers is overstocked. On the other hand, there is a fair, moderate, and, in some districts, good demand for agriculturists (farm and station hands), and female domestic servants, but the wages given now are lower than formerly."

The report from Cape Colony and British Bechuanaland is: "At the present time there is no demand for male labour, the supply on the spot being more than sufficient. There is an opening for farmers with some capital, but knowledge of the country is absolutely necessary before investing money. There is but little opening for farm labourers, native labour being largely employed. Good female domestic servants are in some demand in the colony, but they should, if possible, arrange to be received by friends on their arrival, as there is no provision for their reception. As a rule, where such servants are required, arrangements are made by the employers to have them sent out from England." The wages for servants range from 35s. to 50s. per month for housemaids, and £4 to £8 per month for cooks, all found. Emigration to Natal is recommended only to those who possess sufficient capital to buy and stock land or to undertake dairy and poultry farming. Small capitalists will do well to seek work for wages on their first arrival, as some knowledge of the country is very desirable before investing money.

ELECTRIC SUGAR REFINING COMPANY.*

This company claims to possess the secret of refining sugar by electricity, and it must actually possess it, provided the samples of refined exhibited by it are manufactured by them in the manner stated. These samples show a sugar evidently made by an entirely different process than any known refinery uses. The enterprise thus far partakes of the character of the "Keely motor," in that its secret is known only to the discoverer and his wife (a prudent woman, it appears) and in that a number of confiding stockholders have parted with sufficient money to equip an electrical refinery on the most liberal scale, the visible evidence of which is before us. Everything except the secret machinery, which is enclosed in a sort of burglar-proof safe on a large scale, is open to inspection, and facilities can be seen for filling 3,000 to 4,000 barrels of refined sugar per day—a capacity almost equal to the largest of our present refineries. It is said, for the last time, that in the course of a month or two, we shall see this most extraordinary sight of cargoes of raw sugar dumped into a hopper, and, after passing through the mysterious safe, reappear in any required grade of dry refined sugars, and having lost in the process less than one per cent. of its crystallizable contents. The whole time required for refining being about two hours. The cost of producing sufficient electricity to accomplish the result is placed at a remarkably low figure, which, if realised, will rank the discovery as one of the marvels of the age, and revolutionize the whole sugar refining business. In this age of wonders it will not do to "pooh," "pooh," at anything electricity is claimed to be capable of, and the sugar trade waits with anxious, not to say somewhat excited interest, the developments of the next few months. Its success would so cheapen sugar to the consumer that consumption would enormously increase.—From *Willett & Hamlen's Circular*, (New York,) January 19.

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* In the *Sugar Cane* for September, 1885, page 490, we gave a synopsis of a report of a trial of this "process" on 14th July, and in the October number same year, page 545, will be found a copy of the Prospectus of this Company. Capital, $1,000,000, in 10,000 shares.

WEEKLY STATEMENT OF COMPARATIVE PRICES OF RAW

For the last Fifty-two Weeks, compared

	German Beetroot 88 o/o Prompt, free on board.						French Crystals. No. 3, f.o.b.			West India. Good Brown.			Java afloat. No. 15 and 16.		
	1887.		1886.		1885.		1887.	1886.	1885.	1887.	1886.	1885.	1887.	1886.	1885.
Jan. 7..	11/3	11/1½	15/7½	15/9	10/3		13/9	18/-	14/3	10/9	14/9	9/9	13/7½	17/9	14/-
14..	11/1½		14/9		11/3	11/-	13/9	17/6	15/3	10/9	14/3	10/6	13/4½	16/9	15/-
21..	11/4½	11/1½	15/-	14/7½	11/6	11/3	13/9	17/6	15/3	10/9	14/3	11/-	13/6	16/4½	15/-
28..	11/1½	11/-	14/-		11/10½	11/4½	13/9	17/-	15/3	10/9	14/-	11/-	13/6	16/3	15/-
Feb. 4..	11/-	10/7½	13/9	14/-	11/-	11/6	13/9	16/9	15/3	10/9	14/-	11/-	13/6	16/-	14/3
11..	10/9		13/7½		11/7½	11/9	13/9	16/9	15/-	10/9	14/-	11/-	13/4½	15/9	14/9
18..	10/9		12/6	12/9	11/9	11/10½	13/6	16/-	15/3	10/9	13/3	11/3	13/5	15/-	15/-
25..	10/6		13/3	12/10	12/1½	12/3	13/6	16/-	15/9	10/6	12/9	11/6	13/-	15/6	15/3
March 4..	10/7½		18/1½	13/3	12/6	11/10½	13/6	15/9	15/9	10/6	13/-	11/6	12/9	15/6	15/3
11..	10/10½	10/9	13/-	12/10½	12/3	11/9	13/6	15/9	16/-	10/6	12/9	11/6	13/1½	15/6	15/-
18..	10/9		12/4½		11/10½	12/-	13/6	15/6	16/-	10/6	12/6	11/6	13/3	14/6	15/-
25..	10/10½	11/-	12/6		12/-	12/3	13/6	15/3	16/-	10/6	12/6	11/6	13/6	14/9	15/-
April 1..	11/3	11/4½	12/3		12/6	12/1½	13/7½	15/3	15/9	10/6	12/6	11/6	13/6	15/-	15/3
8..	11/4½		12/7½	12/9	12/1½	12/3	13/9	15/9	15/9	10/6	12/9	11/9	13/6	15/-	15/3
15..	11/7½		13/-	13/1½	12/3	12/4½	13/10½	15/9	15/9	10/9	12/9	11/9	13/9	15/6	15/3
22..	11/7½		13/6		12/9	12/7½	13/9	16/-	15/9	10/9	13/-	11/9	13/7½	15/9	15/3
29..	11/7½		13/9	13/1½	13/-	12/10½	13/7½	16/-	16/-	10/9	13/-	12/-	13/7½	15/9	15/6
May 6..	11/4½	11/10½	13/3	13/-	14/-	13/10½	13/6	15/9	17/-	10/9	12/9	12/9	13/7½	15/6	16/3
13..	11/9	11/10½	12/9	12/7½	14/6	14/9	13/6	15/6	18/-	10/9	12/6	13/3	13/6	15/-	16/9
20..	12/-	11/10½	12/-		16/-	15/3	13/6	15/3	19/-	10/9	12/-	15/-	13/6	14/3	18/6
27..	11/10½	12/-	11/9		17/-	16/9	13/6	14/9	19/6	10/9	11/9	15/9	13/3	14/-	19/-
June 3..	11/6	11/7½	11/1½		15/10½	16/4½	13/6	14/3	19/-	10/9	11/6	15/6	13/4½	13/6	18/9
10..	11/9	11/10½	10/6		16/-	16/4½	13/4½	13/9	19/3	10/6	11/-	15/-	13/6	13/3	18/9
17..	12/-	12/9	10/10½		17/-		13/7½	14/-	19/6	10/9	11/-	15/6	13/7½	13/4½	19/-
24..	12/3	13/-	11/1½	10/10½	16/-	16/1¼	14/3	14/3	19/3	11/-	11/3	15/3	13/10½	13/6	18/6
July 1..	12/7½	12/10½	11/1½		15/4½	15/10½	13/10½	14/6	19/-	11/-	11/3	14/9	13/10½	13/6	18/3
8..	12/10½	13/4½	11/3	11/4½	15/9	15/4½	13/10½	14/3	18/6	11/-	11/3	14/-	13/10½	13/7½	17/9
15..	13/6	13/3	11/6	11/7½	15/-	14/7½	14/-	14/6	18/-	11/-	11/3	13/3	13/10½	17/7½	17/-
22..	13/-	12/7½	11/3		14/-	15/-	14/1½	14/6	17/9	11/-	11/-	13/6	13/9	13/6	16/9
29..	12/6		11/3	11/4½	15/-	15/1½	14/1½	14/3	17/6	11/-	11/-	13/6	13/9	13/4½	16/9
Aug. 5..	12/4½	12/9	11/-	10/10½	14/7½	14/10½	14/-	13/9	17/6	11/-	11/-	13/3	13/10½	13/3	16/7
12..	12/6		11/-	11/1½	14/9	14/10½	14/-	13/4½	17/6	11/3	11/-	13/6	13/10½	13/-	17/-
19..	12/7½	12/9	11/3	11/1½	15/-	15/3	14/-	13/4½	17/9	11/3	11/-	13/9	14/-	12/9	17/6
26..	12/6		11/1½	11/-	15/7½	15/6	14/1½	13/4½	18/6	11/3	10/9	14/-	14/1½	13/-	18/-
Sept. 2..	12/6	12/7½	11/-	10/10½	15/7½	15/9	14/4½	13/4½	19/-	11/3	10/9	14/6	14/3	13/-	18/3
9..	12/6	12/7½	11/1½	11/3	16/1½	16/-	14/6	13/6	19/-	11/3	10/9	15/-	14/3	13/3	18/6
16..	12/7½	12/6	11/6	12/-	15/6		14/6	14/-	19/-	11/3	11/-	11/9	14/3	13/9	18/3
23..	11/9	11/7½	12/-	11/9	15/3	15/1½	14/6	14/-	18/6	11/3	11/-	14/3	14/-	14/3	17/9
34..	11/7½	11/10½	11/9	11/1½	15/-	14/9	15/-	13/9	18/-	11/3	11/-	14/-	13/9	14/3	17/9
Oct. 7..	11/10½	12/-	11/-	10/10½	15/-	15/4½	15/3	13/3	18/6	11/6	10/9	14/3	14/-	13/9	18/-
14..	12/-	11/10½	10/9		15/6	14/7½	14/6	13/-	17/9	11/3	10/9	13/9	14/-	13/6	17/9
21..	11/10½	12/1½	10/9		15/-	14/9	14/6	13/-	17/6	11/6	10/9	13/9	14/1½	13/3	17/6
28..	12/3	12/4½	10/3	10/4½	14/3	14/4½	14/7½	12/9	17/6	12/-	10/9	13/6	14/6	13/1½	17/6
Nov. 4..	12/6	12/7½	10/1½	10/3	14/-	14/1½	14/10½	12/9	17/6	12/6	10/6	13/6	14/10½	13/1½	17/3
11..	13/4½	13/7½	10/6	10/7½	14/6	14/7½	16/-	13/-	17/6	13/-	10/6	13/9	16/-	13/3	17/-
18..	13/10½	13/9	10/10½	10/7½	15/-	15/1½	16/3	13/6	17/9	13/3	10/9	14/-	16/6	13/6	17/6
25..	13/4½	13/10½	10/9		14/9	15/-	16/6	13/4½	17/9	13/3	10/9	14/3	16/3	13/4½	17/6
Dec. 2..	14/3	14/6	10/9	10/10½	15/1½		17/-	13/3	17/9	13/6	10/9	14/3	16/9	13/3	17/9
9..	15/6	15/3	11/6	11/1½	15/7½	15/6	17/9	13/4½	17/9	14/-	10/9	15/-	17/4½	13/9	18/-
16..	15/-	15/3	11/6	11/-	15/7½		17/9	13/6	17/9	14/-	10/9	15/-	17/4½	13/7½	18/-
23..	15/6	16/-	11/-		15/6		18/-	13/6	17/9	14/6	10/9	15/-	17/6	13/6	17/9
30..	16/3	16/1½	11/-		15/6	15/7½	18/6	13/6	18/-	15/-	10/9	15/-	18/-	13/6	17/9

AND REFINED SUGAR, from January to December, 1887, 1886, & 1885.

with those of the two previous years.

	Tate's Cubes.			Martineau's Titlers.			Say's Loaves, f.o.b.			Lebaudy Loaves, f.o.b.		
	1887.	1886.	1885.	1887.	1886.	1885.	1887.	1886.	1885.	1887.	1886.	1885.
Jan. 7..	19/-	23/-	20/-	17/-	21/3 21/6	18/-	15/6	—	17/-	15/-	—	16/-
14..	19/-	23/-	21/-	17/-	21/3	18/6 19/-	—	—	17/3	—	19/6	16/9
21..	19/3	22/6	21/-	17/3	21/-	18/6 19/-	—	—	17/3	15/3	—	16/9
28..	19/-	22/-	20/9	17/3	29/6	18/6	15/6	—	17/3	15/3	18/-	16/9
Feb. 4..	19/-	21/9	20/6	17/3	20/3	18/3 18/6	—	—	—	—	18/-	—
11..	18/9	21/6	20/9	17/-	20/3	18/6 18/9	—	—	—	15/-	18/-	—
18..	18/9	21/-	20/6	17/-	19/9	18/3	15/3	—	—	—	—	—
25..	18/9	21/-	20/9	17/-	19/6	18/6	—	—	17/6	—	17/6	—
March 4..	18/9	21/-	20/9	17/-	19/3	18/9	—	—	17/6	14/9	—	17/3
11..	18/9	21/-	20/-	17/-	19/3	18/3 18/6	—	17/6	—	14/9	—	—
18..	18/9	20/9	20/-	17/-	19/-	18/3	—	—	—	14/9	17/-	—
25..	18/9	20/9	20/-	17/-	19/-	18/- 18/3	—	17/3	—	14/9	17/-	—
April 1..	18/9	20/9	20/6	17/-	19/-	18/3	15/-	—	—	14/9	—	—
8..	19/-	21/-	20/-	17/-	19/-	18/- 18/3	—	17/3	—	—	17/-	—
15..	19/3	21/3	20/6	17/-	19/3	18/3 18/6	—	17/6	17/3	—	17/3	—
22..	19/-	21/6	21/-	17/-	19/3	18/9	—	17/9	17/9	14/10½	17/6	17/3
29..	19/-	21/9	21/3	17/-	19/6	19/- 19/3	—	18/-	17/9	—	—	—
May 6..	18/9	21/6	21/9	17/-	19/6	20/-	15/-	—	18/9	14/9	—	—
13..	19/-	21/-	22/6	17/-	19/3	21/-	—	—	19/-	14/9	17/3	—
20..	18/9	20/6	23/3	17/-	19/-	21/9 22/-	—	—	20/6	14/10½	17/3	—
27..	18/9	20/6	24/6	17/-	18/9	22/6	—	17/3	21/-	14/10½	—	17/3
June 3..	18/9	20/-	24/-	17/-	18/3	22/-	—	—	—	14/10½	16/9	—
10..	18/9	20/-	23/-	17/-	18/-	21/6	—	16/6	20/6	14/10½	—	—
17..	19/-	20/-	23/6	17/-	17/9	21/6	—	16/6	—	14/10½	16/-	—
24..	19/3	20/-	23/-	17/-	18/-	21/6	15/3	—	—	15/-	16/-	—
July 1..	19/3	20/3	23/-	17/-	18/-	21/3	15/-	—	—	—	16/-	—
8..	19/3	20/3	22/6	17/3	18/3	21/3	15/-	16/6	20/-	—	16/-	—
15..	19/3	20/3	21/6	17/3 17/6	18/3	21/-	—	—	19/6	15/-	16/-	—
22..	19/3	20/3	21/9	17/3 17/6	18/3	20/6 21/-	15/-	—	—	—	16/3	—
29..	19/3	20/-	22/-	17/3 17/6	18/3	20/6	15/-	—	19/6	—	16/-	—
Aug. 5..	19/-	20/-	22/-	17/3 17/6	18/3	20/6	15/-	—	—	—	16/-	—
12..	19/-	20/-	22/3	17/3 17/6	18/3	20/6	15/-	—	—	15/1½	16/-	—
19..	19/-	20/-	22/6	17/6	18/3	20/9	15/3	—	20/-	15/1½	16/-	—
26..	19/6	20/-	23/-	17/9	18/3	21/-	15/4½	—	—	15/3	15/9	—
Sept. 2..	19/6	20/-	23/3	17/9	18/3	21/3	—	—	—	—	15/6	—
9..	19/6	20/-	23/6	17/9 18/-	18/3	21/6	15/6	16/6	22/3	15/6	15/6	—
16..	19/6	20/3	23/-	17/9	18/3	21/6	—	—	22/3	15/9	16/-	—
23..	19/3	20/3	22/6	17/6 17/9	18/3	21/3	15/6	—	21/6	—	16/-	—
30..	19/-	20/-	22/-	17/6	18/3	21/-	—	—	20/9	—	15/6	—
Oct. 7..	19/3	20/-	22/-	17/6	18/3	21/-	15/6	—	20/9	—	19/6	20/6
14..	19/6	20/-	22/-	17/6	18/-	21/-	15/6	—	20/9	—	15/6	—
21..	19/9	20/-	22/-	17/6	18/-	20/9	15/9	—	20/6	—	15/3	—
28..	20/-	20/-	22/-	17/9	17/9	20/9	16/-	—	20/-	—	15/-	—
Nov. 4..	20/-	20/-	22/-	17/9	17/6	20/6	16/-	15/3	19/6	—	14/9	—
11..	21/-	19/6	22/-	19/-	17/6	20/6	17/3	15/-	19/6	17/1½	14/9	—
18..	21/3	19/6	22/-	19/3	17/3	20/6	18/-	15/-	19/6	17/7½	14/9	—
25..	21/-	19/6	22/6	19/-	17/3	20/9	18/-	—	19/6	17/7½	14/9	—
Dec. 2..	21/6	19/6	22/6	19/6	17/3	20/9	18/3	—	19/6	17/9	14/9	—
9..	22/-	19/6	23/-	20/-	17/3	21/3	18/9	15/6	20/-	18/9	15/-	19/3
16..	21/6	19/6	23/-	20/-	17/3	21/3	18/9	15/6	20/-	20/-	15/-	—
23..	22/-	19/6	23/-	20/6 21/-	17/3	21/- 21/3	19/-	15/6	19/9	19/-	—	19/3
30..	22/6	19/6	23/-	21/- 21/6	17/3	21/3	19/9	—	19/9	19/7½	—	19/3

H. H. Hancock & Co., 27, Mincing Lane, London, E.C.

TABLE, SHOWING THE CONSUMPTION OR QUANTITY RETAINED FOR MANUFACTURING PURPOSES OF THE LEADING ARTICLES OF COMMERCE, AND OTHER STATISTICS OF THE UNITED KINGDOM.

For Twenty Years, 1868-1887.

Compiled by Francis Reid & Co., Brokers, Liverpool.

Year.	Estimated Population. 31st Dec.	Sugar. Raw and Refined.		Molasses.		Tea.		Coffee.	
		Tons.	Lbs. per Head.	Tons.	Lbs. per Head.	Lbs.	Per Head.	Lbs.	Per Head.
1868	30,450,000	561,135	41 03	37,379	2·75	106,918,118	3·51	30,608,464	1·01
1869	30,750,000	583,369	42·17	37,088	2·70	111,889,118	3·64	29,109,113	0·94
1870	31,100,000	666,368	48·00	35,790	2·50	117,622,575	3·78	30,629,710	0·99
1871	31,500,000	720.201	49·93	34,181	2·43	123,529,642	3·92	31,010,645	0·98
1872	31,750,000	715,400	50·47	31,045	2·19	127,792,412	4·02	31,661,311	1·00
1873	32,000,000	786,033	55·02	28,220	1·97	132,022,155	4·12	32,330,928	1·01
1874	32,200,000	853,845	59·40	13,705	0·96	137,422,563	4·27	31,860,080	0·99
1875	32,400,000	942,703	65·17	37,375	2 58	145,458,120	4·36	32,526,256	1·01
1876	32,700,000	852,438	58·39	21,540	1·47	149,132,185	4·56	33,342,288	1·02
1877	33,000,000	834,692	56·66	13,910	0·94	151,275,237	4·58	32,830,224	0:99
1878	33,200,000	903,597	60·97	30,943	2·09	157,691,762	4·75	33,393,248	1·00
1879	33,500,000	914,742	61·13	36,057	2·41	160,652,187	4·80	34,696,256	1·04
1880	34,000,000	946,094	62·33	8,617	0·57	158,570,334	4·66	32,569,824	0·96
1881	35,300,000	989,208	62·77	12,672	0·80	160,225,789	4·54	31,943,408	0·90
1882	35,700,000	992,893	62·30	8,679	0·54	165,079,881	4·62	31,962,560	0·89
1883	36,000,000	1,066,464	66·36	17,079	1·06	170,812,697	4·74	32,448,080	0·90
1884	36,300,000	1,071,155	66·09	17,163	1·06	175,097,983	4·82	33,016,256	0·91
1885	36,600,000	1,147,351	70·22	17,581	1·07	182,455,982	4·98	33,410,272	0·91
1886	37,000,000	1,100,861	66·65	18,253	1·15	178,894,151	4·83	32,391,184	0·88
1887	37,500,000	1,180,590	70·52	12,485	0·75	183,635,885	4·89	30,052,064	0·80

Note.—For statistics prior to 1868, and from 1843, see the *Sugar Cane* for February, 1883, pages 94–103.

TABLE, SHOWING THE CONSUMPTION OR QUANTITY RETAINED FOR MANUFACTURING PURPOSES, OF THE LEADING ARTICLES OF COMMERCE, AND OTHER STATISTICS OF THE UNITED KINGDOM.

For Twenty Years, 1868-1887.

Compiled by Francis Reid & Co., Brokers, Liverpool.

Year.	COCOA.		RICE.		TOBACCO.		TALLOW.		WINE.	
	Lbs.	Per Head.	Tons.	Lbs. per Head.	Lbs.	Per Head.	Tons.	Lbs. per Head.	Gallons.	Per Head.
1868	5,730,223	0·19	134,729	9·91	41,280,001	1·36	57,163	4·02	15,151,741	0·50
1869	6,564,216	0·21	175,038	12·75	41,719,500	1·36	59,056	4·30	14,840,158	0·48
1870	6,943,109	0·21	92,802	6·72	41,717,012	1·34	77,879	5·32	15,168,321	0·50
1871	7,333,988	0·23	103,649	7·37	42,775,334	1·36	67,630	4·81	16,237,756	0·52
1872	7,853,165	0·25	189,796	13·39	43,948,427	1·38	60,644	4·28	16,873,955	0·53
1873	8,311,023	0·26	162,042	11·37	45,944,485	1·44	73,976	5·18	18,027,104	0·57
1874	8,863,579	0·28	144,010	10·02	45,787,816	1·40	57,575	4·01	17,284,385	0 54
1875	9,973,926	0 31	168,687	11·66	47,026,912	1·45	45,052	3·11	17,349,370	0·54
1876	10,428,478	0·32	152,742	10·46	47,681,858	1·46	63,579	4·36	18,671,089	0·57
1877	10,060,637	0·30	192,355	13·06	49,300,088	1·49	56,300	3·82	17,671,273	0·54
1878	9,980,162	0·30	112,669	7·60	47,969,263	1·44	42,347	2·86	16,272,295	0·49
1879	10,111,526	0·30	181,167	12·11	47,309,809	1·41	49,100	3·28	14,945,093	0·45
1880	10,566,159	0·31	217,219	14·31	48,261,775	1·42	54,808	3·61	15,852,335	0·47
1881	10,897,795	0·31	253,563	16·09	48,481,049	1·38	42,896	2·72	15,644,757	0·44
1882	11,996,853	0·34	212,035	13·30	49,055,938	1·37	44,993	2·82	14,431,282	0·40
1883	12,868,170	0·36	198,537	12·35	49,565,605	1·38	39,921	2·48	14,382,983	0·39
1884	13,963,891	0·38	158,152	9·76	50,772,513	1·40	45,720	2·82	14,075,625	0·39
1885	14,595,168	0·40	121,457	7·43	51,325,060	1·40	42,085	2·58	13,848,748	0·38
1886	15,165,714	0·41	177,812	10·76	50,972,001	1·38	39,599	2·39	13,252,503	0·36
1887	15,873,698	0·42	128,084	7·64	52,156,389	1·39	29,280	1·07	13,694,476	0·36

TABLE, SHOWING THE CONSUMPTION OR QUANTITY RETAINED FOR MANUFACTURING PURPOSES OF THE LEADING ARTICLES OF COMMERCE, AND OTHER STATISTICS OF THE UNITED KINGDOM.

For Twenty Years, 1868-1887.

Compiled by Francis Reid & Co., Brokers, Liverpool.

Year.	British & Foreign Spirits.		Foreign Wool.		Cotton.		Raw Silk	
	Gallons.	Per Head.	Lbs.	Per Head.	Lbs.	Per Head.	Lbs.	Per Head.
1868	28,610,658	0·94	147,673,844	4·85	1,005,463,536	33·02	4,105,882	0·13
1869	29,624,124	0·96	141,853,383	4·61	948,298,512	30·81	2,524,215	0·08
1870	31,707,609	1·02	166,819,579	5·36	1,099,751,092	35·36	3,638,782	0·17
1871	34,454,883	1·09	184,412,542	5·73	1,406,281,520	44·64	4,961,500	0·16
1872	33,618,968	1·06	165,397,521	5·21	1,142,620,304	36·30	3,949,890	0·12
1873	37,779,940	1·19	189,824,608	6·12	1,318,087,232	41·19	2,718,322	0·09
1874	40,510,613	1·26	194,438,122	6·04	1,427,984,768	44·35	3,201,596	0·10
1875	42,427,400	1·31	189,059,859	5·84	1,233,200,864	38·06	1,939,019	0·06
1876	41,796,449	1·28	213,065,992	6·51	1,291,165,568	39·48	2,943,904	0·09
1877	40,420,555	1·22	218,546,900	6·62	1,188,365,920	36·01	2,784,453	0·08
1878	40,722,383	1·23	196,195,351	5·90	1,194,310,320	35·97	2,333,393	0·07
1879	38,475,646	1·15	167,793,165	5·01	1,287,063,568	38·42	2,517,273	0·08
1880	35,764,464	1·05	222,945,958	6·56	1,404,697,616	41·31	2,733,676	0·08
1881	37,094,323	1·05	181,684,961	5·15	1,466,423,616	41·54	1,986,628	0·06
1882	36,916,312	1·03	220,513,147	6·18	1,504,107,696	42·13	2,458,970	0·07
1883	36,765,068	1·02	216,929,406	6·03	1,474,421,088	40·96	2,660,000	0·07
1884	36,634,194	1·01	242,662,342	6·66	1,485,037,792	40·91	4,142,730	0·11
1885	35,956,465	0·99	233,514,124	6·39	1,203,496,224	32·88	1,698,719	0·04
1886	34,894,662	0·94	281,484,150	7·61	1,503,099,360	40·62	1,699,361	0·05
1887	34,353,096	0·91	255,098,448	6·80	1,488,612,944	39·70	2,371,742	0·06

TABLE, SHOWING THE CONSUMPTION OR QUANTITY RETAINED FOR MANUFACTURING PURPOSES OF THE LEADING ARTICLES OF COMMERCE, AND OTHER STATISTICS OF THE UNITED KINGDOM.

For Twenty Years, 1868-1887.

Compiled by Francis Reid & Co., Brokers, Liverpool.

Year.	TOTAL VALUE OF IMPORTATIONS.		TOTAL VALUE OF BRITISH AND IRISH PRODUCE EXPORTED.		RAILWAYS IN UNITED KINGDOM.		
	£	Per Head.	£	Per Head.	Capital Expended.	Per Head.	Nett Profit ℘ cent.
1868	294,460,214	194/0	179,463,644	118/0	486,893,400	319/10	4·13
1869	295,460,214	192/1	190,045,230	123/7	490,950,770	319/4	4·45
1870	303,257,493	195/0	199,586,822	128/1	504,381,000	324/4	4·49
1871	330,754,359	210/0	223,066,162	141/1	520,400,000	330/5	4·69
1872	353,375,740	222/7	255,961,609	161/3	537,285,640	338/5	4·83
1873	370,380, 42	230/3	255,073,336	159/5	569,047,346	355/8	4·75
1874	368,435,432	228/11	239,436,207	148/9	578,320,308	359/2	4·80
1875	373,941,125	230/10	223,494,570	138/0	590,223,494	361/0	4·72
1876	375,093,771	229/5	200,639,204	122/6	658,214,776	402/7	4·17
1877	393,941,256	238/9	198,731,073	120/4	674,059,048	408/7	4·13
1878	366,059,610	220/6	192,804,334	116/2	698,545,154	420/10	4·25
1879	362,127,741	216/2	191,503,672	114/4	717,000,000	428/10	4·15
1880	411,210,056	241/2	222,810,526	131/1	728,317,000	432/4	4·38
1881	395,656,350	224/2	233,938,919	132/7	745,528,162	422/5	4·29
1882	412,001,683	230/10	241,477,156	135/3	767,899,570	430/2	4·32
1883	425,603,932	236/7	239,829,744	133/3	784,921,312	436/1	4·80
1884	389,774,549	214/9	232,927,575	128/4	801,464,367	441/7	4·68
1885	373,834,314	204/4	213,031,407	116/5	815,858,055	446/–	4·04
1886	349,381,087	188/10	212,363,995	114/9	828,344,254	447/9	3·94
1887	361,935,006	193/0	221,398,440	118/1	840,000,000 Estimated.	448/	..

TABLE, SHOWING THE CONSUMPTION OR QUANTITY RETAINED FOR MANUFACTURING PURPOSES OF THE LEADING ARTICLES OF COMMERCE, AND OTHER STATISTICS OF THE UNITED KINGDOM.

For Twenty Years, 1868-1887.

Compiled by Francis Reid & Co., Brokers, Liverpool.

Year.	Declared Value of Gold, Silver, and Specie.				Bank Interest.	Income Tax.	
	Imported.	Per Head.	Exported.	Per Head.	Annual Average per cent.	Nett Amount Assessed fo Property and Profits.	Per Head.
	£		£				
1868	24,852,595	16/4	20,220,014	13/3	2·10	386,542,366	253/11
1869	20,500,991	13/4	16,391,999	10/8	3·20	389,421,002	253/3
1870	29,455,668	18/11	18,334,450	12/2	3·04	398,222,811	256/1
1871	38,140,327	24/3	33,760,671	21/5	2·88	419,850,798	266/7
1872	29,505,319	18/7	30,335,861	19/1	4·10	434,802,952	271/9
1873	33,454,724	20/11	28,899,285	18/1	4·79	453,585,000	283/6
1874	30,380,268	18/10	22,853,593	14/2	3·70	481,002,000	298/9
1875	33,264,789	20/6	27,625,042	17/7	3·24	498,260,040	307/7
1876	37,057,353	22/8	29,464,082	18/0	2·61	503,676,578	308/7
1877	37,162,534	22/6	39,798,119	24/1	2·88	490,344,906	297/2
1878	32,421,490	19/6	26,686,546	16/1	3·77	493,598,158	297/4
1879	24,065,656	14/4	28,609,912	17/1	2·51	490,425,774	292/9
1880	16,287,964	9/7	18,889,503	11/1	2·76	486,077,028	285/11
1881	16,864,918	9/7	22,502,819	12/9	3·48	490,966,686	278/2
1882	23,620,579	13/3	20,389,258	11/9	4·16	504,158,462	282/5
1883	17,201,311	9/7	16,414,211	9/1	3·58	519,435,375	288/7
1884	20,321,853	11/2	21,999,222	12/1	2·95	531,129,500	292/7
1885	22,751,720	12/5	21,783,105	11/11	2·92	530,480,682	289/10
1886	20,863,895	11/3	20,957,405	11/4	3·04	529,413,000	286/2
1887	17,765,315	9/6	17,131,018	9/2	3·34	540,000,000 Estimated.	288/

WAGES AND PRICES IN 1838 AND 1888, OR COMPARISON.

The following comparison of wages and prices paid 50 years ago with those paid now, ought to convince "Fair Traders" that Free Trade is very far indeed from being adverse to the interests of the working classes at heart. It is an answer to the advocates of protection in America, who are constantly speaking of the "starvation wages" paid in this country. As the result of a free trade policy:—

Under Protection.—1838.

Rates of Wages :	
Mechanics	16/- to 20/- per week.
Labourers, other than agricultural	10/- ,, 21/- ,,
Agricultural Labourers	6/- ,, 7/- ,,
Prices of Provisions :	
Flour	3/10, 4/- a stone.
Bread	1/-, 1/2 per 4-lb. loaf.
Beef	1/4 per lb.
Mutton	1/2 ,,
Bacon	11d. ,,
Cheese	1/- to 1/4 per lb.
Butter	2/4 ,, 2/6 ,,
Potatoes	1/6 per stone.
Hours of Labour :	
Mechanics	66 per week.
Agricultural Labourers	68 ,,
Other Labourers	66 ,,
Rent :	
Working-man's cottage, of two rooms	3/6 ,,

Under Free Trade.—1888.

Rates of Wages :	
Mechanics	25/- to 35/- per week.
Labourers, other than agricultural	18/- ,, 20/- ,,
Other Labourers	9/- ,, 10/- ,,

Price of Provisions :

Flour	1/2 to 1/6 per stone.
Bread	5d. to 6d. per 4-lb. loaf.
Beef	7d. to 9d. per lb.
Mutton	6d. ,, 8d. ,,
Bacon	6d. ,, 8d. ,,
Cheese	6d. ,, 8d. ,,
Butter	10d. to 1/- ,,
Potatoes	9d. per stone.

Hours of Labour :

Mechanics	56½ per week.
Other Labourers	56½ ,,
Agricultural Labourers	60 ,,

In proportion to the population there were far more workmen of every description unemployed in the days of protection than there are now.

These figures are taken from the note book of a gentleman who can speak of the two periods in question from actual experience and observation.

MR. GÖRZ'S ESTIMATE OF THE APPROXIMATE CONSUMPTION OF SUGAR IN EUROPE AND THE UNITED STATES FOR 1885, 1886, AND 1887.

For Mr. Licht's figures for the same periods see page .

	1887.	1886.	1885.
Germany	420,000	418,000	409,000
Austria-Hungary	260,000	255,000	250,000
France	452,000	445,000	439,000
Russia	360,000	348,000	330,000
Holland and Belgium	80,000	78,000	76,000
England	1,179,000	1,107,000	1,150,000
Europe (others)	315,000	302,000	290,000
Total for Europe	3,066,000	2,953,000	2,944,000
,, ,, United States	1,370,000	1,275,000	1,181,000
,, ,, Europe and the United States	4,436,000	4,228,000	4,125,000

YEARLY RECEIPTS AT THE FOUR PORTS, NEW YORK, BOSTON, PHILADELPHIA, AND BALTIMORE (IN TONS), FOR ELEVEN YEARS, 1877–1887.

FROM	Entire Year 1887.	Entire Year 1886.	Entire Year 1885.	Entire Year 1884.	Entire Year 1883.	Entire Year 1882.	Entire Year 1881.	Entire Year 1880.	Entire Year 1879.	Entire Year 1878.	Entire Year 1877.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Cuba	497647	543288	505129	457085	425431	502410	421371	436891	499952	437417	384007
British W. I. Islands	106841	63855	71229	64948	45738	23701	20290	20062	12759	13576	22494
Trinidad, P. S.	44971	36031	38852	37866	30048	8538	3569	5127	2244	10219	
French W. I. Islands	6407	7781	11301	30053	32780	28649	22997	23229	26827	31215	24397
Porto Rico	49975	35665	57962	56430	46526	34693	23902	25816	29535	31917	27463
St. Croix	4424	2226	1849	1279	902	1537	840	1147	1141	1577	1087
Demerara	52831	40634	18678	19625	59614	34519	18613	18551	5878	6347	28910
Central America	13	22	329	444	476	971	585	2493	114	307	12873
Belize	380	228	637	764	833	605	515	655	522	504	
Surinam	1762	1108	962	1403	1637	1944	1674	1555	1681	1385	
Mexico	37	278	167	98	373	430	842	669	956	323	
Hayti & San Domingo	19019	15545	24048	16953	11759	12017	6818	10249	6686	5868	
Brazil	136897	91244	126712	142348	91343	81029	107901	72389	21580	35859	35892
Peru	698	588	1497	943	1137	860	—	824	1539	601	—
Europe	70589	149407	107945	85248	45889	7204	5941	2353	9208	4338	7142
Philippine Islands	84965	140033	89206	96398	109081	75634	80940	74079	48941	41435	71117
Java	4602	5709	8074	3254	576	5422	15707	15537	13316	15602	17955
China	—	4373	—	3865	7593	3827	5501	11353	—	2481	12898
Singapore	—	....	—	221	595	364	—	109	—	54	1087
Sundries	19606*	21661†	18351‡	13646§	7759	9801	7365	9742	4488	1606	7120
Foreign	1101664	1159696	1082928	1032871	920090	834155	745371	732830	687367	642631	654442
Domestic	8977	1391	6226	9380	4386	5296	7839	5854	21640	11645	9985
Total	1110641	1161087	1089154	1042251	924476	839451	753210	738684	709007	654276	664427

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* Mauritius, 9,276 tons; Tuticorin, 1,928 tons; Sandwich Islands, 8,402 tons. † Mauritius, 1,529 tons; Tuticorin, 10,679 tons; Sandwich Islands, 9,453 tons. ‡ Mauritius, 9,035 tons; Tuticorin, 9,316 tons. § Mauritius, 7,350 tons; Tuticorin, 6,176 tons; Cape Town, 120 tons.

From Willett, Hamlin & Co.'s Circular, New York.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

Year Ended December 31st, 1887.

Board of Trade Returns.

IMPORTS.

Raw Sugars.	Quantities.		Value.	
	1886.	1887.	1886.	1887.
	Cwts.	Cwts.	£	£
Germany	5,670,482	7,573,636	3,393,990	4,488,678
Holland	281,034	408,408	176,982	231,020
Belgium	757,727	1,068,683	450,703	640,351
France	47,361	68,186	27,824	41,426
British West Indies & Guiana	1,976,105	2,148,245	1,561,210	1,557,883
British East Indies	877,369	853,663	431,617	410,072
China and Hong Kong	48,257	16,312	28,005	12,201
Mauritius	291,759	104,986	181,215	57,498
Spanish West India Islands	21,409	176,358	15,459	109,330
Brazil	597,995	865,281	378,698	476,603
Java	3,909,462	3,200,343	2,853,467	2,085,627
Philippine Islands	555,757	460,386	276,606	210,438
Peru	472,311	436,634	335,755	277,307
Other Countries	633,978	574,108	428,907	335,843
Total of Raw Sugars	16,141,006	17,955,229	10,540,438	10,934,277
Molasses	—	—	137,980	101,822
Total Raw Sugars	—	—	10,678,418	11,036,099
Refined Sugars.				
Germany	1,830,142	2,834,924	1,494,759	2,204,566
Holland	1,185,027	1,503,522	1,010,602	1,186,828
Belgium	109,996	216,717	100,506	181,184
France	996,392	1,551,435	810,608	1,189,280
United States	1,424,030	782,552	1,230,562	627,798
Other Countries	821,440	121,612	672,412	88,801
Total of Refined	6,367,027	7,010,762	5,319,449	5,478,457

EXPORTS.—Refined Sugars.

	Cwts.	Cwts.	£	£
Denmark	146,052	112,070	95,645	65,510
Belgium	51,378	40,991	35,471	25,270
France	42,931	33,017	31,447	21,204
Portugal, Azores, & Madeira	97,673	78,907	68,360	48,022
Italy	143,084	99,267	98,058	65,334
British North America	18,614	29,115	12,196	20,702
Other Countries	353,001	311,811	265,584	219,106
Total	852,733	705,178	606,761	465,148

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of December compared with the corresponding month of the two preceding years, and the average monthly imports for the year compared with those of 1884, 1885, and 1886, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country :—

Countries from which Sugar has been imported.	"LUMPS AND LOAVES."							"OTHER SORTS." Including Crushed Loaf, Granulated, Crystallized, &c.							TOTAL.						
	Monthly Average.				Dec.	Dec.	Dec.	Monthly Average.				Dec.	Dec.	Dec.	Monthly Average.				Dec.	Dec.	Dec.
	1884	1885	1886	1887	1885	1886	1887	1884	1885	1886	1887	1885	1886	1887	1884	1885	1886	1887	1885	1886	1887
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
France..............	2737	2035	1462	1363	1067	1787	1451	1621	546	2688	5099	427	3698	4146	4358	2581	4150	6462	1494	5485	5597
Holland	3580	4247	3508	3780	2755	2907	3918	1948	1555	1428	2483	2031	1659	3949	5528	5802	4936	6263	4786	4566	7867
Germany & Austria ..	552	956	990	1347	1000	1552	1390	2380	2859	6634	10463	9552	10194	22359	2932	3815	7624	11810	10552	11746	23749
Belgium	183	214	344	592	242	225	508	151	116	113	308	237	234	590	334	330	457	900	479	459	1098
United States	962	722	854	454	659	59	..	3386	10654	5078	2804	6612	237	261	4348	11376	5932	3258	7271	296	261
Russia	..	..	..	3	..	..	..	..	..	3412	452	10504	..	500	..	..	3412	455	10504	..	500
Other Countries	..	..	..	..	11	..	..	121	12	9	15	..	..	180	121	12	[illegible]	15	11	..	180
Total	8014	8174	7158	7539	5734	6530	7267	9607	15742	19362	21624	29363	16022	31985	17621	23916	26520	29163	35097	22552	39252

SUGAR STATISTICS—GREAT BRITAIN.

To January 21st, 1888 and 1887. In Thousands of Tons, to the nearest Thousand.

	STOCKS. 1888.	STOCKS. 1887.	DELIVERIES. 1888.	DELIVERIES. 1887.	IMPORTS. 1888.	IMPORTS. 1887.
London	58	74	12	15	16	13
Liverpool ..	89	80	16	14	20	17
Bristol	3	3	4	3	3	3
Clyde	45	40	14	9	16	13
Total ..	195	197	46	41	55	46
	Decrease.. 2		Decrease.. 5		Increase.. 9	

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

For the four principal Ports. In Thousands of Tons, to the nearest Thousand. To December, 1887 and 1886.

	STOCKS. January 1st. 1888.	STOCKS. January 1st. 1887.	DELIVERIES. In December. 1887.	DELIVERIES. In December. 1886.	IMPORTS. In December. 1887.	IMPORTS. In December. 1886.
New York	42	84	51	61	44	51
Boston	4	15	7	12	4	9
Philadelphia....	—	1	10	11	10	10
Baltimore	..	..	..	..	..	..
Total......	46	100	68	83	58	70
	Decrease ..54		Decrease.. 15		Decrease .. 12	
Total for the Year	—	—	1165	1116	1111	1161

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, January 19th, 1888.

Fair Refining.	96o/o Centfs.	Granulated.	Stand. A.	Stock in Four Ports.
Jan. 19, 1888.—5 5-16c.	6c.	7⅛c.	6⅝c.	Jan. 1, 1888— 47,798 tons.
Jan. 20, 1887.—4⅝c.	5 3-16c.	5⅞c.	5 7-16c.	Jan. 1, 1887—102,279 tons.
Jan. 21, 1886.—5½c.	6⅛c.	6⅝c.	6¼c.	Jan. 1, 1886— 57,328 tons.
Jan. 22, 1885.—4 15-16c.	5½c.	6⅜c.	6c.	Jan. 1, 1885— 89,186 tons.
Jan. 24, 1884.—5 13-16c.	6 11-16c.	7 13-16-⅞c	7 7-16c.	Jan. 1, 1884— 60,900 tons.
Jan. 25, 1883.—6 13-16c.	7⅞c.	8⅝c.	8⅛c.	Jan. 1, 1883— 50,297 tons.
Jan. 26, 1882.—7⅛c.	7¾c.	9¼-5-16c.	8⅞c.	Jan. 1, 1882— 43,927 tons.
Jan. 27, 1881.—7½c.	8⅛c.	9 5-16-⅜c.	8⅞c.	Jan. 1. 1881— 66,999 tons.
Jan. 22, 1880.—7⅞c.	8 11-16c.	9½c.	9¼c.	Jan. 1, 1880— 63,558 tons.
Jan. 23, 1879.—6⅝c.	7⅜c.	8 9-16-⅝c.	8¼-⅜c.	Jan. 1, 1879— 50,773 tons.
Jan. 24, 1878.—7⅜c.	8 5-16c.	9¼-⅜c.	9c.	Jan. 1, 1878— 48,230 tons.
Jan. 25, 1877.—9½c.	10⅜c.	10 5-16c.	10 1-16c.	Jan. 1, 1877— 25,885 tons.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE 31ST DECEMBER, FOR THREE YEARS, IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts.*	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
186	220	38	320	178	20	962	1138	1076

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING 31ST DECEMBER, IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts.*	TOTAL 1887.	TOTAL 1886.	TOTAL 1885.
1241	440	42	443	227	339	2732	2561	2622

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROP, OF THE THREE PREVIOUS CAMPAIGNS.

(From Licht's Monthly Circular.)

	1887-88. Tons.	1886-87. Tons.	1885-86. Tons.	1884-85. Tons.
France	400,000	488,299	298,407	308,410
German Empire	910,000	1,018,842	838,131	1,154,817
Austro-Hungary	412,500	523,061	377,032	557,766
Russia and Poland.	427,500	479,582	537,860	386,433
Belgium	100,000	91,120	48,421	88,463
Holland and other Countries	50,000	50,000	37,500	50,000
Total	2,300,000	2,650,904	2,137,351	2,545,889

As compared with Mr. Licht's estimate of December 24th, the present shows an increase for Germany of 22,500 tons, and for Russia of 27,500 tons, and a decrease for Austria of 12,500 tons.

Mr. Görz's estimate for 1887-88 is 2,301,000 tons, practically the same. At page 114 we give Mr. Görz's figures, showing the consumption for the past three years, which differ considerably with those of Mr. Licht, given above.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

Contrary to expectation, there has been a general decline in values during the past month, more especially in beet 88 per cent., which at one time amounted to 1s. 10½d. per cwt., since partially recovered. The fog which prevailed for nearly a week, interfered with business, and helped, together with the desire of some speculations to realize, to send down prices. The statistical position is not much changed, and if peace in Europe should be maintained, we shall see much higher prices. Should war unfortunately break out, it would probably produce a panic, the first effect of which would be a large and immediate importation of beet sugar, both raw and refined, with lower prices, to be followed later on by more than a corresponding rebound.

The stocks at the four ports of the United States are now only one-half what they were a year ago, and to make up this deficiency and meet the increasing consumption, the United States' refiners will be compelled to come to Europe to make out their supplies; especially, as hitherto, they have taken almost the whole of the Cuban crop, whilst this year large contracts has been made in this country for these sugars—a new feature of recent times.

The deliveries in the United Kingdom up to 21st January amounted to 45,677 tons against 40,706 same period in 1886, and the imports to 55,129 tons against 46,152 in 1886.

The Stocks in the United Kingdom on 21st January were 194,577 tons against 197,116 tons same time last year.

Present quotations for the standard qualities, as under, are:—

	Floating.		Last Month.
Porto Rico, fair to good Refining	13/6 to 14/–	against	14/6 to 15/-.
Cuba Centrifugals, 96°/o polarization	15/6 to 16/–	,,	16/6 to 17/-.
Cuba Muscovados, fair to good Refining..	13/6 to 14/–	,,	14/6 to 15/-.
Java, No. 15 to 16, good to strong	16/3 to 16/6	,,	17/3 to 17/9.
	Landed.		**Last Month.**
Madras Cane Jaggery..	10/6 to 11/–	against	11/–
Manilla Cebu and Ilo Ilo	10/– to 11/–	,,	10/6 to 11/-.

Paris Loaves, f.o.b.	18/9	against	19/–
Titlers	20/3	,,	21/–
Tate's Cubes..	21/6	,,	22/6
Austrian-German Beetroot, 88°/o f.o.b. ..	15/–	,,	16/3

THE

SUGAR CANE.

No. 224. MARCH 1, 1888. Vol. XX.

☞ The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to Henry Thorp, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see page iii.

A new company is being formed, styled "The London Produce Clearing House, Limited," capital one million sterling. The *Standard* of February 24th has, we are glad to see, a very strong article on this venture—it says: "The true functions of the new company is that of "stake-holder in a gamble. It is designed to open the markets of "Mincing Lane to the man in the street, the loafer in the clubs, the "frequenters of city taverns, anybody and everybody able to command a five pound note. Were genuine dealings in sugar and "coffee alone in question, a capital of £50,000 would have been quite "enough for any company of the kind; but the aim is free gambling, "not honest business, and hence this great parade of money."

At page 127 we give a list of the Directors and Founders; the latter are to receive 25 per cent. of the remaining profit, after paying six per cent. on the ordinary shares. The article from the *Standard* we reproduce *in extenso*. (Page 128.)

The adjourned annual general meeting of the Coffee and Cocoa section of the London Chamber of Commerce was held on February 27th, when a discussion took place as to the establishment of the "London Produce Clearing House."—The Chairman (Mr. H. Pasteur) in his address said that to say the least, the subject which they had met to discuss introduced a new system in dealing with colonial produce in London which might have very serious consequences for the trade, and on that account he thought it was a question which should be examined and discussed calmly and impartially by those interested in the various branches of the coffee trade.

Mr. Figgis proposed the following resolution:—

"That this meeting of merchants, brokers, and others interested in the coffee trade, deprecate the establishment of a bank and *caisse de liquidation*, intended, under the title of the "London Produce Clearing House," principally for the settlement of time bargains in coffee, which, in our opinion, will be detrimental to the interests of the trade, and by unduly encouraging speculative transactions, with constant fluctuations in paper coffee, will render business in the real article uncertain and precarious, to the injury of growers, importers, and dealers and distributors of coffee."

Mr. Walton proposed an amendment to adjourn the subject for six months. This was seconded by Mr. Porter, and carried by a majority of 14.

At page 175 we give Mr. Licht's estimate for the next campaign, 1888-89, which Mr. Licht truly states "cannot be taken into account." To us it appears simply absurd at this stage, and indeed for the next three or four months, to form any estimate whatever. We put it to Mr. Licht, what good object can be served, in now giving any figures at all? We quite agree with our contemporary *The Journal des Fabricants de Sucre* when, in speaking upon this point it says:—

"Although Mr. Licht distinctly states that this estimate cannot possess any real value, and adds that in case the excess over the current campaign which it shows should come to be realised, the fact could not exercise any unfavourable influence on the position of the article, it is none the less regretable to see at this point of time figures supplied which *are destitute of any foundation whatever.* The contracts for the beets are not yet concluded; the cultivators are themselves ignorant of what they will do when the time for sowing arrives; the yield and the quality of the future crop are purely problematical; the political and commercial situation may undergo considerable modifications between now and seed time; and in presence of so many unknown elements an estimate is formulated of the production of a crop which is not yet sown! Really this is going too fast, and it is not by acting in such a manner that statisticians in sugar matters will gain the confidence of the public."

The Merchants and Planters' Gazette (Mauritius) of January 5th, 1888, announces the death, at the early age of 27, of Mr. F. Engebrecht, the proprietor of that paper.

In our issue of December 1st, 1887, page 619, we stated that Mr. J. de Zimeno Cammack had accepted the Editorship of the *Havana*

Weekly Report, in error for the *Havana Herald*, which, like the *Weekly Report*, is published weekly and contains information of special interest to those engaged in the sugar trade.

The project for establishing a Swiss Sugar Manufactory, so often spoken of, is now being realized; the capital having been subscribed and the land secured. The factory is to be at Hochdorf (Canton Lucerne), and will be able to work up 250,000 centners of beets yearly.

PERUVIAN GUANO.—We learn that the Anglo-Continental (late Ohlendorff) Guano Works of London, Hamburg, Antwerp, and Emmerich-on-Rhine, have just concluded a fresh contract with the Chilian Government, by virtue of which they continue to have the extensive contract of all new importations of Peruvian Guano in the United Kingdom and other countries.

It is not surprising that the famous sugar "Trust," which has recently been formed in the United States, is attracting a great deal of attention, not only in the United States, but throughout the sugar world. At page 153 we give a list of those refineries which form the "Trust," with the names of those who have not joined the ring.

As an illustration of the working of this "Trust," it may be mentioned that immediately before its formation a cargo of 2000 tons of Manila fetched in the competing market 4⅝ cents per lb.; granulated sugar at the time selling at $5\frac{11}{16}$ cents per lb. Immediately after the "Trust" was completed, a similar cargo of Manila, with practically only one customer for it in New York, brought 4¼ cents per lb., or a difference of ⅜ of a cent per lb., which, upon a cargo of 2000 tons, is equal to £3500 against the importer; whilst granulated was sent up to 7½ cents per lb.; that is to say, the raw sugar, under this dictatorship, fetched 1s. 9d. per cwt. less, and granulated was advanced 5s. 6d. per cwt.,—a difference in favour of the "Trust" of 7s. 6d. per cwt.!!

We cannot say that we regret this state of things, inasmuch as it will bring the sugar question home to every consumer of sugar in the United States, and will result in greatly strengthening the hands of those who are now strongly advocating free sugars.

We have had sent to us advance sheets of a pamphlet containing information relating to the Sorghum sugar industry in Kansas, taken from the report of the Kansas State Board of Agriculture, for the quarter ending December 31st, 1887.

It gives a historical sketch of this industry, and contains a mass of figures to show that with bounties and protective duties, Sorghum sugar can be made a most important industry in Kansas. In March, 1887, the State granted a bounty of 2 cents. per lb. (9s. 4d. per cwt.) for every pound of sugar made in the State from Sorghum or Beet, for the next five years; this added to the Customs duty, practically gives the domestic producer an advantage over foreign sugars of 19s. per cwt. Last season 234,607 pounds of sugar (105 tons) were made, and the bounty amounted to £940. We are glad to notice the absence, in this pamphlet, of that high-falutin style which some writers on Sorghum so often indulge in.

German Sugar Companies, 1887-88.—*Görchen* shows on a total production of M. 651,525, a loss of M. 21,674. This factory made a loss of M. 43,285 on the previous year's working.

Pakosch, with a total production of M. 1,062,697, shows a loss of M. 136,263. The balance on the wrong side last year was already M. 198,975, so that this factory is now M. 335,238 to the bad.

Munzel-Holtensen shows a loss of M. 45,560, and was already M. 11,876 to the bad last year.

Frellstedt; this company, which last year wrote off M. 180,000, and paid a dividend of 5 per cent., will probably show a still better result this year.

Mr. Vernon, of New York, in a letter to the *Manufacturers' Record*, in giving his views as to the disposal of the surplus of the United States' revenue, upon the proposition that all sugars and molasses should be admitted free, and that the planters should be compensated, if necessary, says: "Abolish the duty on sugar, molasses, and rice, and the present sugar and rice interests of the country, which are gradually recovering from the effects of war, demoralised labour and overflows, will be ruined, and from $100,000,000 to $120,000,000 in gold will be annually transferred from our accumulated wealth to the coffers of foreign nations without any adequate compensation or increase of commerce, and ultimately the price of sugar and rice will be higher than it is now" ! !

SUGAR OUTLOOK.

In the present position of the market, which is just recovering from an unlooked-for depression, it may be interesting to show from figures, substantially reliable, that there was little cause for the decline in prices which has taken place since Christmas.

If we take from Mr. Czarinkow's Circular the stocks on 1st February, 1887 (as specified below), we find them to be 1,313,185 tons; whilst, on the 1st October (eight months later) they had fallen to 571,902 tons, indicating a consumption for the eight months of 741,283 tons

Taking the stocks on the 1st February, 1888, and deducting the consumption of last year as a basis—and not allowing for any increase in the consumption, which will probably be 100,000 tons—we get the following result:—

	Tons.
Stocks, 1st February, 1888	1,057,671
Eight months consumption as above	741,283
Indicating a stock on 1st October, 1888	316,388

In other words, a *reduction*, as compared with 1st October, 1887, of 255,514 tons.

Another matter of paramount importance is the extraordinary position of demand and supply on the Continent; when this is taken into account, it will be readily understood why fabricants are very stiff in their demands, which have resulted in the price of beet sugar being relatively dearer by 1s. 6d. per cwt. than cane sugar.

	Tons.
Last season's beet crop (1886-87) produced......	2,728,810
Of which were exported in twelve months ending September 30th, 1887	386,900
Leaving.......................	2,341,910

for home consumption; and this we may assume will be required for the season ending September 30th, 1888.

	Tons.
Crop for 1887-88, latest estimate	2,384,550
Of which the United Kingdom has received for the four months ending 31st January, 1888.	187,000
Leaving..................... ..	2,197,550

Taking the consumption of the Continent for 1887-88 at the figures for the year 1886-87, it would appear that their supplies between now and 1st October next, will fall short of their own requirements by 144,360 tons. In this estimate of European requirements, be it noted, that Great Britain is not included.

As regards cane supplies, they are not likely to be in excess of last year; even if there should be an increase, it is more than met by excluding from our estimate any increase in consumption.

Whatever may be the result of the meeting of the International Sugar Congress, one thing is quite certain, that the new law in Germany, as it now stands, is against the farmer, as compared with last season, by 1s. per cwt., and large sowings will not be entertained; however, whatever they may be, the new crop (1888-89) cannot be available until November, when our very moderate stocks will be barely sufficient to keep our refiners going.

Stocks of Sugars, exclusive of Cargoes Afloat, on respective Dates, 1887 and 1888.

	1st February, 1887.	1st October, 1887.	1st February, 1888.
United Kingdom	200,401	179,166	202,845
France	267,422	92,821	201,599
Germany	413,501	42,713	312,000
Austria	167,300	42,500	155,000
Holland	68,497	19,050	31,938
Belgium	51,064	4,652	40,289
	1,168,185	380,902	943,671
United States	113,000	146,000	93,000
Havana	32,000	45,000	21,000
	1,313,185	571,902	1,057,671

	Tons.
Stocks, 1st February, 1887	1,313,185
,, 1st October, 1887	571,902
Eight months' Consumption	741,283
Stocks, 1st February, 1888	1,057,671
Deduct eight months' consumption as above	741,283
Leaving for Stock on 1st October, 1888	316,398

THE LONDON PRODUCE CLEARING HOUSE, LIMITED.

Capital, £1,000,000, in 100,000 shares.

Present issue, £500,000, in 50,000 shares.

£1 per share on application, and £1 10s. on allotment; for the present it is not intended to make any further call beyond this £2 10s.

Directors.

Francis Augustin Browne, Esq. (Carey and Browne), 36 and 37, Mincing Lane.
Alexander Patrick Cameron, Esq. (Maclaine, Watson, and Co.), 9, Billiter Square.
Cæsar Czarnikow, Esq., 29, Mincing Lane.
Hermann Fortlage, Esq. (A. Tesdorpf and Co.), 147, Fenchurch Street.
Charles Seton Sinclair Guthrie, Esq. (Chalmers, Guthrie, and Co.), 9, Idol Lane.
Francis John Johnson, Esq., Director of the London Joint Stock Bank (Limited), 5, Princes Street.
Henry John Jourdain, Esq. (Blyth, Greene, Jourdain, and Co.), 12 and 13, Nicholas Lane.
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Robert Ryrie, Esq. (Arbuthnot, Ewart, and Co.), St. Mildred's Court.
Benjamin Dixon Tabor, Esq. (W. H. Cole and Co.), 85, Gracechurch Street.

Bankers.—London Joint-Stock Bank (Limited), 5, Princes Street, E.C., and Branches.
Brokers.—Messrs. W. Greenwell and Co., 21, Finch Lane, E.C.
Solicitors.—Messrs. Hollams, Son, and Coward, Mincing Lane, E.C.
Secretary (pro tem.)—H. Schumann, Esq.
Temporary Offices—16, Mincing Lane, E.C. (First Floor).

Founders.

The Founders who have guaranteed the present issue of capital include the following firms:—

André, Reiners, and Co.
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W. H. Cole and Co.
C. Czarnikow.
Fruhling and Goschen.
Antony Gibbs and Sons.
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Hardy, Nathan, and Sons.
Fred. Huth and Co.
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Kleinwort, Sons, and Co.
Knowles and Foster.
Maclaine, Watson, and Co.
Megaw and Norton.
Rösing Bros. and Co.
N. M. Rothschild and Sons.
I. A. Rucker and Bencraft.
J. Henry Schröder and Co.
A. Tesdorpf and Co.
Wallace Bros.
Wogan and Co.

The *Standard* of February 24th has the following article upon this "Clearing House," which it looks upon as very objectionable, and "the more striking its success, the more will it demoralize business":—

For some time past Mincing Lane has been in a condition of suppressed excitement about a new company, which was to be started to revolutionise the produce markets there. This morning the prospectus of that company makes its appearance in our columns, and puts the public in a position to estimate the character of the project which has occasioned so much talk. It discloses, for one thing, that the company is to be most powerfully sponsored. Upwards of two dozen firms, containing among them the first houses in London, have been found willing to figure on the prospectus as "founders" or underwriters of the half-million of capital to be offered to the public next Monday. Barings are there, and the Rothschilds, and Frühling and Goschen, and the Hambros, and the Huths, and the Schröders—as imposing an array of names as ever propped a foreign State or aunched a brewery. There must be something good, one would think, in a project which finds so many merchant princes and princely financiers to back it. Certainly, it looks a modest and innocent scheme enough. "The object of the company," says the prospectus, "is to place on a secure basis, by a system of deposits, the dealing in produce for future delivery, which has become such an important development of trade both in Europe and America." By the "facility" and the "security" which the company will provide, it is contended that business which now goes past London will be brought back to it. Mincing Lane, in a word, will become again the leading market of the world for coffee, and for other produce too, should this company succeed, and will no longer be the dead and alive spot it now is. In proof that this happy revolution is about to be effected, the "eminent success" of similar institutions elsewhere is pointed to. A "Caisse de Liquidation" has existed for a number of years at Havre, and a similar institution was recently established in Hamburg, and these have been "very profitable undertakings"—a fact which we can believe. They have also, say the promoters, given important and safe development to local trade—which is a statement that requires a great deal of independent proving before it can obtain credence. For an important distinction has to be drawn between the prosperity of the Caisse or Clearing House and the prosperity of its patrons. There is no reason to doubt that the keepers of the gaming tables at Monaco prosper, but it does not follow that the gamesters do so. In like manner, some of the stock-gambling agencies which take deposits and deal on "margins"—the "bucket shops," as they are familiarly called—appear to make money; but it is at the expense of their customers. The fallacy underlying such statements as those in this prospectus is that they treat gambling as if it were a productive industry, which is exactly what it is not. A thousand bags of coffee may be passed from hand to hand fifty or a hundred times at ever-varying prices, and be worth just the same money at the end of it all as at the beginning. All that happens in the transit is that a certain number of people are made poorer by so many commissions, and the differences which they have to pay.

Regarded in this light, then, we are bound to say that the new company appears to promise a prosperous career to its shareholders—at any rate for a time—at the price of a very great deal of loss to the public. Its ways of earning money are plainly and honestly set out in the prospectus. Each contract or bargain will carry a brokerage, money will be lent at interest, and members will pay entrance fees and subscriptions. By-and-by, when metals, cotton, corn, seeds, &c., are added to the coffee and sugar with which the concern is to be started, the range of chances of gain will be immense. No broker in Mincing Lane will then be able to stand outside the company's doors. They must become members of the huge produce "bucket-shop," or perish. The company will thus grow to be the most powerful controller of the produce markets which it is possible to imagine, able to dictate its terms to the brokers, and to "rig" or depress prices at its pleasure. At present, and owing to the opposition it has met with at its inception, it modestly promises that the leading brokers in each article shall be consulted by the directors in the framing of regulations for dealings; but that is a condescension which is pretty sure soon to become unnecessary. Profits are assured to the company, but the more its gains expand, the more money the public lose. Such has been the experience at Havre and at Hamburg, where the reckless speculation in produce fostered by the Caisse de Liquidation has brought about commercial failures and wide-spread ruin. It stands to reason that such consequences must follow this mode of doing business. The Clearing House now to be started is not merely a centre where bargains can be adjusted, set off against each other, or liquidated. Within such limits, it would have been a useful institution. But that work would not require the intervention of a joint-stock company, any more than the "clearing" of bankers or of the Stock Exchange. The brokers of Mincing lane could easily have formed themselves into an association for this purpose, had they been so inclined, and might have done so without modifying their ways of doing business in the manner now proposed. The true function of the new company is that of stake-holder in a gamble. It is designed to open the markets of Mincing lane to the man in the street, the loafer in the clubs, the frequenter of city taverns—anybody and everybody able to command a five pound note. Were genuine dealings in sugar and coffee alone in question, a capital of fifty thousand pounds would have been quite enough for any company of the kind; but the aim is free gambling, not honest business, and hence this great parade of money. The company must have enough margin of means to be able to attract deposits and to guarantee the payment of differences; to lend, also, to its unlucky customers. From this point of view the proposed business wears an extremely repulsive appearance, but—such is the extent to which speculative habits now prevail—it may be all the more profitable for that. There, indeed, lies the sole justification, such as it is, for the creation of this company. "People will gamble," it is said, "and if we do not enable them to do so at home they will go to Havre or Hamburg." This is quite true, and were the project based openly and frankly on this ground there would be little more to be said. Its existence would have to be regretted, but it would at least not come into being under false pretences.

The founders of the company, however, hold altogether lofty language. They euphemise gambling bargains as "special transactions," and announce that by placing these on "a good commercial basis" the company may be "considered as of general advantage to British trade," which is now "injured" by so much "business" being diverted to other channels. Take the cant away from this language, and all we have left is an assertion, probably true, that the people who have hitherto thrown the dice at Havre or Hamburg will now do so in London. They will do this, and their example will draw thousands of people after them to lose money for the good of the "Clearing House." But this has nothing to do with the prosperity of British trade. All the gambling in the world will not make the English people larger drinkers of coffee than they have been, or greater eaters of sugar. But it is quite possible that a considerable portion of the large transit trade in produce of all kinds which now centres in London might be lost to us as the result of "bear" speculations conducted under the wing of the "Clearing House." Or there might be an excessive importation, as the consequence of a "rig up" of prices, which would end equally disastrously. The best that can be said for such an institution is that it may provide a readier market than Mincing Lane now does, with its old-fashioned ways and prejudices. Producers may be always, or almost always, sure of finding their goods saleable here, at some price or other. That is a plausible view, at least; but is it an advantage which outweighs the positive mischiefs sure to follow the introduction of the Havre system? Let us allow that under the present quiet, half-secret modes of doing business the market sometimes takes the merchant or the producer, or both, at a disadvantage, and still it does not follow that some plan less objectionable would not have met the necessities of the case. But there is no complaint hinted at against London modes of doing business. They are not gambling modes, that is all. Tom, Dick, and Harry cannot now stake their "fivers" at a public table in the Lane, and lose them for the good of the keepers thereof; so the promoters of the scheme—foreigners, we believe, and men themselves of little standing in British commerce—mean to give them this additional chance. Genuine business cannot be helped by such means; but it does not follow that consumers will, on the average, suffer. They might gain. Now and then, no doubt, they would have to pay an unjustifiably high price for some article in which the crowd had a fancy to speculate for the rise, but this would be compensated for by the long periods of collapse and low prices which always follow escapades of this sort. There would have been no adverse criticisms if the Mincing Lane brokers had formed an association, or groups of associations, like the cotton brokers of Liverpool, in order to adjust or control their own or their customers' time bargains; because speculation would then have been for the most part legitimate, conducted by men who knew their business. It is because this "Clearing House" scheme is intended to attract the multitude that it is so objectionable. The more striking its success, the more will it demoralise business.

NÉO-DÉCOLORANT.

From the *Journal des Fabricants de Sucre.*

We have before us a sample of a new animal, or bone black Néo-décolorant, obtained by the Ducat process, which seems worthy of being pointed out to our readers. The inventor of this new product starts from the principle that no charcoal can replace bone black (noir animal) for industrial purposes, and he has sought to form a charcoal the properties of which should be identical with those of animal carbon, whilst its cost price should be considerably lower. M. Ducat has ascertained by experiment that in every portion of the animal were to be found products capable in practice of replacing the bones, blood, &c. By supplementing these animal products by the addition of certain minerals and metalloids, he has succeeded in forming a charcoal, of which the physical and chemical properties are, according to his assertion, of a superior nature. Néo-décolorant has been employed with success in purifying sweets, syrups, alcohols with a bad flavour, petroleum, glycerine, and divers other substances. It can be restored a great number of times by very simple means in ordinary ovens. The prices of this decolorising black is only 12frs. per 100 kilogs, equal to about 4s. 10d. per cwt.

BELGIUM AND THE CONFERENCE.

The following letter has been addressed by the Sugar Refiners' Committee to Baron de Worms:—

The Baron HENRY DE WORMS, M.P., &c., &c.

Sir,

With reference to the assertion of Mr. Guillaume, the Belgian Delegate at the International Conference on the sugar bounties, that the present Belgian system of assessing the duty on the juice is more consistent with the spirit of freedom which, according to his assurance, prevails in that country, than the system of manufacturing in bond, I venture to direct your attention to an article in the *Sucrerie Belge* of January 15th, 1884, a copy of which I beg to forward to you.

You will see by this article that, in the opinion of the Editor of the organ of the Société Générale des Fabricants de Sucre de Belgique, the system of assessment of duty on the juice, so warmly defended by M. Guillaume, is in every way most onerous to the manufacturer, and so contrary to the spirit of liberty and freedom invoked by M. Guillaume that it hinders the operations at every step and positively prohibits the introduction of improvements in the manufacture. Moreover, in spite of all this minute and continuous interference with the various processes, it is so ineffectual that, "le jus, base de l' impôt, peut être soustrait à celui-ci par divers moyens."

The writer concludes as follows:—

"Qui donc calculera jamais la perte qu' une législation aussi minutieuse, aussi méticuleuse, a infligée à l'industrie sucrière depuis que, malgré elle, elle est parvenue à prendre de l'extension en Belgique! Combien de progrès enrayés, combien d'operations faites en pure perte, combien de découvertes étouffées an berceau, combien de procès malheureusement provoqués faut-il attribué à un régime pareil qui, s'il constitue une certaine protection, constitue aussi une véritable camisole de force comprimant tous les movements, enserrant tous les membres, laissant vivre l'industriel peut-être, lui faisant même quelque compensations, soit, mais lui enlevant la liberté et l'indépendance sans lesquelles il n'est rien de grand ni de puissant."

I venture to think that you will find that the details contained in this article are a sufficient condemnation of the Belgian system, even from the point of view of M. Guillaume.

I am, Sir,
Your obedient servant,
GEORGE MARTINEAU.

21, Mincing Lane, London,
9th February, 1888.

FOREIGN VIEWS ON THE CONCLUSIONS OF THE INTERNATIONAL SUGAR CONGRESS, DECEMBER, 1887.

The *Deutsche Zuckerindustrie* commenting on the paragraph in the Queen's Speech relating to the Congress, remarks:—"The statement of the results hitherto attained by the Conference is no doubt accurate, but this does not exclude the fact that by far the most difficult part of the task yet remains to be performed, and will require the utmost goodwill on the part of all the Powers represented at the Congress, and a large amount of mutual concession. And when this task is finally accomplished, the statutory confirmation of the contracting States will further be required. There can, therefore, be no doubt that no alteration of the existing legislation, consequent on the decisions of the Conference, can be made at any rate for the coming campaign."

This is confirmed by a declaration of the Belgian Minister of Finance, made on the 31st January.

At the sitting of the Austrian Lower House on the 23rd ult., the following resolution was adopted:—"The Government is requested to do its best for the furtherance of the international efforts now being made for the suppression of premiums arising from the sugar duties in all sugar-producing countries, and to use its influence in this direction with the United Government."

The Committee of the Central Union of Austro-Hungarian Sugar Manufacturers, at their sitting of the 27th January, brought in the following report:—

"It has been decided to address a memorial to the Imperial Government, indicating the position of the Austro-Hungarian sugar manufacturers in this highly important and far reaching matter, based on the following premises:—

The abolition of the premiums on exported sugar is in the interests of those colonies and countries in which cane sugar is produced, inasmuch as the capability of growing the latter to a profit will thereby be enhanced.

At the meeting at Prague, on the 11th April, 1886, 189 sugar manufacturers of the Austrian Empire declared themselves in favour of the necessity of premiums on their sugar so long only as the premiums should exist in other countries, and in so doing expressed no opinion contrary to the abolition of premiums, so long as it should be universally adopted and in a manner such that no premiums, whether open or concealed, should any longer be possible in any country. For this, however, the decisions adopted by the London Conference, and the project for a Convention sketched out by it, offer no guarantee. The various Governments concerned are to indicate in a universally applicable scheme for taxation of the product, to be handed in to the English Government before the 1st March, the limits within which and the cases in which "Saccharimetry" should be used, and whether they would be inclined to adopt the so-called "French method." But, in view of the fact, that by this method the possible yield in refining cannot be ascertained, its application to "refining in bond" would secure the opening of a wide field for concealed premiums. Furthermore, Belgium has declined to substitute for the taxation on the juice the taxation on the manufactured article, and has only declared herself ready to reduce, but not to abolish, her premiums. England herself has excluded a large number of her colonies, amongst them the East Indies, with their important sugar production, from participation in the Convention. Finally, the names of all the extra European States are wanting in the London Protocol, amongst others, North America, which grants large premiums and sends considerable quantities of refined sugar to Europe.

The Imperial Government is therefore besought not to give its assent to the principles of this project for a Convention, and further, not to take part in any Convention for a fixed term of years, but to reserve to itself the right of giving notice of withdrawal at any time when from such an agreement such injurious consequences to the Austro-Hungarian sugar industry shall arise as to cause a renewed granting of premiums to appear necessary."

The Rhenish Branch-Union of Sugar Manufacturers has expressed an opinion in favour of the fairness of a year's notice of withdrawal. The *Deutsche Zuckerindustrie* agrees with this view and with those of the Austrian Central-Verein on this point, and says:—

"Whatever security the system of taxation eventually agreed on may offer, the application of the system would be the most important thing, and therefore Germany more especially, where, as is well known, the Excise laws are carried out with painstaking conscientiousness, must secure herself against the injury which might arise to her industry from a lax application of the law in another country. The Rhenish Branch-Union in stating the motives for claiming this right of notice of withdrawal, says that England has declined to levy countervailing duties. This is not warranted by the Protocol itself, nor has any formal statement to that effect been made. On the whole, the proceedings do not seem to us to have reached the point for making such an assertion; and on the contrary, we are of opinion that the levying of countervailing duties on bounty-fed sugar, wherever it may come from, must form a condition with those countries which participate in the projected Convention."

As might be expected, the minds of French sugar producers and agriculturalists continue excited, not only by the attitude of the representatives of France at the Congress, to the participation in which the whole sugar interest was strongly opposed, but in an even greater degree by the action of the Government in the financial proposal of M. Tirard. Protests and petitions are pouring in from all sides, and the language used is decidedly energetic. Thus the agriculturists of the Somme, in their protest addressed to the Ministers, Senators and Deputies, wind up by appealing to their patriotism and enlightened solicitude, entreating them to *oppose with all their energy* the adoption of M. Tirard's proposal; to *oppose with still greater energy* the conclusion of an international convention respecting sugar, and to maintain in its integrity and without any change, the law of 1884 as modified by the law of July, 1887.

The agriculturists of department Nord have protested against the entertaining of "any idea of an international sugar convention, which England, *the accomplice of Germany*, has got up with the sole intention of putting a stop to that progress and advance which our agriculture and our sugar industry were on the point of attaining."

The *Journal des Fabricants de Sucre* sums up an article, entitled "The Danger of a Convention," by remarking:—

"We have then to do with a conspiracy from without and from within against the sugar industry, and in the uncertainty of success within (inasmuch as the proposal of M. Tirard is exciting on all sides protests which are most fully justified) they are seeking, in this attack on the law of 1884, to secure support from without. The English journals do not conceal their satisfaction, and they are discounting beforehand the results of the future convention which is to give work to 40,000 or 50,000 English workmen, whilst of course an equal, if not greater, number of French workmen will be reduced to inactivity. On the other side, the Queen of England, in the speech at the opening of Parliament, has just declared that the Conference convoked at London, with the view of putting an end, if possible, to the injurious system of premiums, has progressed so far as to render probable the conclusion of a satisfactory arrangement in a short time. And now we are informed that Prince Bismarck has invited Baron de Worms, the President of the Conference, to call upon him, and has received him in the most agreeable manner.

"It is difficult for us to imagine the great Chancellor (whose leanings to the agricultural party are well known, and who has always befriended the German sugar industry,) discussing with Baron de Worms any projects in which German interests would not largely figure. The interest which England has in the success of the Conference, and which the Queen's Speech brings prominently forward, is, on the other hand, simply an English one, and consists in diverting the current of the importation of beetroot sugars in favour of that of the sugars of the British colonies, which have prudently been excluded from the projected Convention.

"One must be blind not to see what is going on, and in default of that clear-sightedness in which our statesmen are wanting, the most elementary patriotism ought to impose on them the greatest reserve in diplomatic relations which we should be too green to suppose have in view the interests of our country, which will only be properly defended by ourselves.

"Never, in face of the mistrust existing in Europe, and the latent condition of hostility which is shown in feverish armaments, has it been more necessary for us to preserve our full liberty. Let us carefully maintain that liberty which is our only strength, nor compromise it further in the pursuit of a Convention absolutely chimerical, from which no good can arise to ourselves.

"The signing of the protocol, in the presence of the attitude of Belgium, retaining her system of taxation, and that of England, refusing to levy countervailing duties, was, as we have already said, a great mistake, which must not be aggravated by associating ourselves any further than is necessary in an engagement where everything is demanded from us and nothing granted to us. It is, after all, the overthrow of the tutelary law of 1884 which is being sought, and those who, whether knowingly or not, are lending their hands to such an enterprise, are manifestly conspiring against the interests of their country. Dupes or greenhorns, such is the part they are playing, and they will be guilty if they persevere.

"Let them beware of so doing. It is a question of the very existence of a great agricultural industry, which in itself alone is, by the productive services which it creates, worth much more than any of these new colonies in which we are pouring forth so much generous blood, and where so many millions are being swallowed up. The ruin of such an industry, consummated by a bad economical *régime*, would be equal to the loss of a province, and a black stain, an ineffaceable stigma would mark the place which the culture of the beet, vanished for ever, once occupied in our country."

SACCHARINE: ITS HISTORY, USES, &c.

Translated from the French of Mons. GASTON TISSANDIER, Editor of *La Nature.*

For some years the attention of chemists has been attracted by the discovery of a new product, obtained from coal tar, and which, having a saccharine taste, has occasionally been put forward as destined eventually to replace cane or beetroot sugar, or at any rate to assume an important position amongst alimentary substances. We have already (23rd October, 1886,) said a few words about saccharine, but we have lately been favoured with a sample of this curious substance, and been able to examine its nature and properties. One of the manufacturers of it, Dr. Henri Van Heurck, of Antwerp, has in addition sent us a detailed technical notice of it, which puts us in a position to give our readers tolerably complete information respecting this new industry.

The discovery of saccharine is due to Dr. Constantin Fahlberg, at present Professor of Chemistry at the Johns Hopkins University of Baltimore, U.S.A. When Dr. Fahlberg first obtained the product "saccharine" he was a chemist in New York.

Saccharine, so called because of its sugary taste, was first called by the name of *anhydro-orthosulph amino-benzoic acid;* its formula is—

$$C_8H_4COSO_2NH.$$

Since the new researches made by Messrs. Fahlberg and Ira Remsen, the original name has been changed for that of benzoic-sulphinide.

Saccharine, as it is prepared for commercial use, is a white powder, extremely fine, which adheres to the fingers, and is as impalpable as starch powder; examined under the microscope, it shows tabular crystals surrounded by more bulky grains. Dissolved in boiling water till saturation takes place, it deposits (on cooling) crystals in the form of short needles, apparently belonging to the monoclinic system.

Saccharine, which has a slightly acid reaction, is sparingly soluble in cold water, but dissolves in ether and especially in alcohol. The new substance is fusible at 218° C.; heated on a platinum plate, it first throws off vapours having a marked odour of bitter almonds, and evaporates completely without leaving any residuum.

Saccharine has a sweet taste, which exceeds in intensity that of sugar, without having, it must be admitted, an altogether agreeable flavour. According to the inventor, one part of saccharine gives a flavour equal in intensity to 212 parts of cane or beetroot sugar. This proportion appears to us difficult to establish, for want of an accurate basis of comparison. Still, it must be admitted that on trying the saccharine itself, the taste is recognised as one of great sweetness, certainly stronger and much more persistent than that of an equal quantity of sugar; it must be added that it has a peculiar after-taste, which is not always perceptible to the same degree in diluted saccharine.

That which specially characterises saccharine, is its perfect harmlessness in the human system; it is neither a food nor a medicine, it is a neutral substance which passes unchanged into the digestive passages, and is entirely eliminated in the urine. We shall see that this property apparently gives the new product a special interest from a medical point of view.

Saccharine may be obtained by employing various substances, but the most economical method of production and the most advantageous in every respect is to extract it from coal tar by means of successive transformations.

We borrow from Dr. Van Heurck the description which he gives of this interesting industrial preparation:

"We commence by extracting the toluene ($C_6H_5CH_3$) from the tar, and converting it into its corresponding monosulphacides, by treating it at a temperature of 100°, with sulphuric acid of 60°B. The toluol, which at first swam on the top, is dissolved in excess in the sulphuric acid, and produces the two monosulphacides which are the isomers of toluene. The liquid is then transferred to other vessels half filled with cold water, where it is neutralised by means of chalk. The combination, passed through a filter-press, is at the same time submitted to washings with warm water to remove the last traces of the toluol-sulphonates of lime which are formed. It is now necessary to obtain from the washed results of the previous operations an alkaline salt; this is effected by treating them with a saturated solution of carbonate of soda. The salt is produced in the liquid in a state of solution, and it is obtained solid by evaporating the liquid, preferably *in vacuo.* The product, having attained a suitable consistency, is poured into moulds, and, after solidification, pulverised and dried in iron evaporators.

When the product has parted with the last traces of water, it is mixed, in a special apparatus, with pentachlorure of phosphorus, perfectly dry and obtained by a special process. By this operation two sulphochlorures of toluene are produced, one of which is solid and the other liquid, and the oxychlorure of phosphorus which is disengaged is driven off by heat.

The liquid sulphochlorure of toluol, that which alone produces the saccharine, is separated from the solid sulphochlorure by allowing the latter to settle and by means of a centrifugal apparatus.

The solid sulphochlorure is not lost, it serves for the reproduction of toluol and of chlorhydric and sulphuric acids. In all the operations of this remarkable chemical achievement which has at once placed Fahlberg in the ranks of the most distinguished chemists of our day, none of the accessory products, or the products employed, are lost. All are recovered, and made use of indefinitely: some small portions only are lost in the operations, and, naturally, have to be replaced.

The liquid chlorure which has been formed is now thoroughly washed, cooled in ice, dried in the air, and transformed into sulphamide of toluene by the aid of carbonate of ammonia and heat. The carbonic acid is disengaged, and there remain chlorure of sodium and sulphamide of toluol. The residue, after the addition of water, is formed into a thick soup and passed through the filter-press; the chlorure of sodium is eliminated by washing, and there remains only the amide, which is almost insoluble, and is dried by a centrifugal apparatus. We have now, by oxidation, to transform the amide into a salt of saccharine, and the latter into pure saccharine.

The first operation is performed by the combined action of an alkaline permanganate and of peroxide of lead. The products obtained are the salt of saccharine corresponding to the permanganate, an alkali, either free or in the state of carbonate, and a hydrated peroxide of manganese in a state of minute division. It only now remains to precipitate the saccharine from its saline combination, which is performed by means of chlorhydric or sulphuric acid, and by crystallising in water the saccharine, is obtained perfectly pure.

This last mode of operation being, however, too cumbrous, a more economical process is in practice employed, which would be too long to describe here, and which consists essentially in oxydising the amide, not by the permanganate but by the peroxide of lead and steam; there are formed oxide of lead and a plumbic salt of saccharine, which is decomposed by sulph-hydric acid, which precipitates the lead in the form of sulphuret, and leaves the pure saccharine in the liquid, from which it is then extracted."

Fahlberg's saccharine is now made on a large scale at Antwerp, but the price is still very high, viz., 125 francs the kilogram.

This curious substance may be advantageously employed to neutralise a bitter or acid taste in food, wine, beer, liqueurs, fruit-syrups, &c., the smallest possible quantity being added.

Saccharine has already been employed in medicine to disguise the bitterness of alkaloids, such as quinine or morphine. It is invaluable for diabetic patients, to whom the use of sugar is forbidden; it supplies these invalids with a harmless substance which permits them to sweeten food of which they have been obliged to deprive themselves.

Whatever may be the future reserved for benzoic-sulphinide, this product undoubtedly constitutes a very interesting discovery. We have designedly omitted the word "synthesis," employed by Dr. van Heurck, for it is not here a question of the production of a natural product, but the obtaining of a chemical substance Wöhler has already performed the synthesis of urea, M. Berthelot has recently effected that of alcohol; the artificial substances obtained by these chemists have the same elementary composition as their natural homologues: Dr. Fahlberg, on the contrary, has produced a compound, which, whilst possessing a flavour analogous to that of sugar, has not the same molecular constitution.

THE ARGENTINE REPUBLIC.

Although the wool clip in the Argentine Republic is a short one, it is reported that the season may be described as a prosperous one, because the grain crops are the greatest ever grown. The Buenos Ayres *Standard*, which is responsible for this statement, estimates the wheat crop at only 490,000 short tons (2,000 lb.), or a little over two million quarters, as compared with 600,000 tons given by the same authority as the quantity produced last year. As the exports last year were not quite a million quarters, they are not likely to exceed that quantity in the current year. The maize crop is reckoned at 480,000 short tons, linseed at 47,000, sugar at 38,000, tobacco at 8,000, fruit, &c., at 50,000 tons; and wine at 6,000,000 gallons. Agricultural crops cover about 5,200,000 acres, and are valued at 12½ millions sterling; while pastoral products are worth about 23 millions. Thirty years ago the agricultural produce was valued at one million sterling only, and pastoral products at about two millions. The exports of frozen mutton last year amounted to 966,000 carcases, weighing 60lb. each on an average. There are now 4,121 miles of railways in the Republic. The number of immigrants in 1887 was 137,426, as compared with 112,409 in the previous year.

JULIUS ROBERT.

From the Vienna *Wochenschrift des Centralvereines für Rübenzucker-Industrie.*

On the 9th ult., at Seelowitz in Moravia, the death took place of Julius Robert, the inventor of the Diffusion Process, Hon. President of the Central Union of Austro-Hungarian Beet Sugar Manufacturers, who leaves a name renowned in commercial and industrial circles, as a man of penetrating intellect, of rare ability of character, and unsurpassed goodness of heart.

He was descended from a respectable French family, of which the three brothers, Louis, Florent, and Justin, emigrated to Austria at the commencement of the present century, and founded at Vienna the wholesale house of Robert & Co., formerly Baboin & Co. He was the only son of Florent Robert, and was born at the family residence at Himberg, near Vienna, on the 4th June, 1826. His father, a man of European reputation as a distinguished manufacturer and merchant, President of the Central Union of Beet Sugar Manufacturers, of the Prague Association of Iron Manufacturers, founder of the factory of Chemical Products at Oberhalm, near Hallein, of the Dyewood Works at Himberg, of the Sugar Factories at Debreczin and Seelowitz, had the lad, whose mother (a German) died early, strictly and carefully educated.

On completing his studies, Julius Robert became the co-adjutor of his father in the Seelowitz Sugar Manufactory, the greatest experimental school of the sugar industry, which has for several decades attracted the attention of all who wanted to learn or who were interested in the progress of sugar manufacturing. And many received their instruction there, and the sugar industry is indebted to this establishment for many of its most prominent and skilful specialists.

It was a peculiar coincidence that Seelowitz completed its fiftieth campaign a few days before the death of Julius Robert. The foundation of this factory, in 1837, took place at a time when the manufacture of beetroot sugar had scarcely surmounted its initial difficulties, and the Roberts, father and son, had to contend with obstacles of which the younger generation of to-day have scarcely an idea.

Guided by his father's keen foresight, Julius Robert laboured steadily for the improvement of the process of production of beetroot sugar. Nothing was left untried, every new idea that turned up became the parent of what were frequently very costly experiments. At Seelowitz, a quarter of a century ago, processes were taken up, and, in consequence of the imperfect means then available, again abandoned, the more accurate fundamental conception of which was later on carried out more successfully and remuneratively by others. To write the history of all the experiments made at Seelowitz, would far exceed the scope of this journal, and the detailed appreciation of the work of Julius Robert as a manufacturer and agriculturist must be left to our *Zeitschrift*. Two great inventions must, however, be mentioned here, the Steam-Apparatus of the father, which still bears the name of Robert, and the Diffusion-Process of the son. Each of these inventions formed a striking epoch in the development of the sugar manufacture, and contributed powerfully to its advancement. No doubt unceasing progress has, in the course of years, changed many things in the Robert Apparatus and the Diffusion Process, but their principle remains unaltered, and the two inventions have secured for these distinguished men an honourable position in the history of the sugar industry.

But the owners of the Seelowitz Sugar Factory were continually endeavouring to improve, not only the mode of the production of beet sugar, but also the production itself. With the sugar factory was connected, what was for those times, a very large refinery, and "Robert's Refined" was at one time one of the favourite and most esteemed brands in the Kingdom.

The generally unfavourable position of the sugar industry, and especially of the refiners, which characterised the year 1875 and those immediately following, times which were no longer adapted for making experiments on a large scale, induced Julius Robert to transfer the chief part of his attention to the agricultural portion of his undertaking, and to confine the operations of his sugar factory to the production of raw sugar. His father had, by means of considerable sacrifices, already endeavoured to bring the tenant estate of Seelowitz to a greater capacity of production, and laboured with success to improve the raw material of the beet, and Julius Robert also tried to attain the best possible results in this direction. Not only was he on a level with the foremost of his time as regarded agricultural operations, but he strove to surpass all, and was an excellent teacher to his employés. Julius Robert brought the first steam-plough into Austria, his endeavours were always directed to intensifying the cultivation, improving the soil, turning the waste products of manufacture to good account, and especially to the accurate co-operation of the sugar industry and agriculture. And his pet idea was the preservation of the fodder; in this direction he was remarkably successful and obtained the French Order, "Pour le Mérite Agricole."

The numerous merits of Julius Robert did not remain unnoticed in the highest quarters. He had already received the knight's cross of the Franz Josef Order, when, on the occasion of the International Exhibition at Vienna, in 1873, where he acted as President of the Jury for Sugar, he was distinguished with the Order of the Iron Crown, No. III., and the foreign decorations of the Commander's Cross of the Spanish Order of Isabella the Catholic and that of the French "Mérite Agricole" above-mentioned.

In the person of Julius Robert, there has passed away one of those rare men who in the wider and nobler sense know not only how to take, but how to give, and who gain recognition and respect lasting far beyond the short time of their earthly existence, and whose constant motto is, as was the case with him, "*Noblesse oblige.*"

Honour to his Memory!

THE RUSSIAN SUGAR INDUSTRY IN 1887.

The *Journal de St. Pétersbourg* for the 13th (25th) January last, contains the following information respecting the Russian sugar industry in 1887, which is extracted from a trade circular issued by the firm of Th. Raffalovitch and Co.:—

As regards the sugar industry the year 1887 commenced under unfavourable auspices; prices had fallen so low that they shut out, even with the manufactories most favourably situated, best conducted, and able to work at the lowest cost, not only the prospect of the smallest profit, but they actually threatened their very existence. Crystallized sugars fell to 3 r. 25 c. per pound delivered at Odessa; it was ruining everyone, so the majority of the manufacturers debated whether it were necessary to make preparations for the new season, or whether it would not be wiser to simply suspend operations.

The situation remained in this state during the month of January and a part of February, 1887. At this time most of the sugar manufacturers met at Kiev, and this year (1887) the meeting was well attended, for each foresaw that he was on the brink of ruin, and that some decision must be taken on which would depend the life or death of this large industry.

One of the most important of the manufacturers brought before the Kiev convention a very elaborate proposal, containing the remedy so much desired.

Starting from the point of view that the Government had done all in its power, and that it could not do more, the initiator of the proposal in question enunciated the principle that sugar manufacturers must look to themselves for an amelioration of their position; some sacrifices must be absolutely necessary in order to carry out the restrictions to which each must be subjected. The eloquence with which these ideas were sustained by their author very soon convinced many of the largest manufacturers in the country, including those of the kingdom of Poland.

The nucleus thus formed worked unremittingly, the circle of adherents continually increased, and after conferences lasting over two months, incessant speeches, and endless discussions, a decision was arrived at upon the measures to be taken. With the exception of a few manufacturers, all adhered to the project and signed the propositions.

These fixed for each of the manufactories:—

1. An obligatory exportation of a proportion of the production in 1886-87.

2. A restriction in its production during the three following seasons.

When an understanding had been arrived at, the prices in the sugar market commence to rise: from 3 r. 15 c. per poud delivered at Odessa, the current price at the end of January, they rose to 3 r. 30c. at the end of February, and reached 4 roubles at the end of March. They remained at this rate during the whole month of April; then the exportation commenced, and after having fallen in May and June to 3 r. 80 c., prices rose again in July to 4 r.; in August, 4 r. 30 c.; in September, 4 r. 50 c.; and prices remained at about this level till the end of the year 1887.

The exportation of sugar commenced at the end of April. The greater part of these exports went to Italy, which paid a price of 33½ lire per 100 kilos., delivered at Genoa or other Italian ports; London prices were proportionately below those of Italy, and with the exception of some insignificant quantities shipped for this country, all was sent to Italy, where the prices rose at this time to 34½ lire. In autumn only the rise in prices became accentuated abroad, and the Italian refineries paid at first 38 lire, then 40 and 42; they were not willing to exceed this price.

The London market showed the highest price; the prices successively obtained were 17s. 6d. per centner, freight and insurance included, 18s., and 18s. 3d. This rise took place very rapidly, and numerous sales were effected for the January-February exports.

From the month of June to the 25th December, 1887, the export of the 1886-87 production almost reached four million pouds,* as follows: By way of Odessa, 2,570,000 pouds; Nicolaiew, 380,000 pouds; Baku, 590,000 pouds; Alexandrovo, 140,000 pouds; Mlava, 100,000 pouds; Astrakhan, 85,000 pouds; and the remainder by way of other Government Custom houses.

In December, 1887, the sugar manufacturers had fulfilled the first part of their convention, and the exportation of sugars of the 1886-87 manufacture was closed.

It was then necessary to deal with the exportation of the surplus manufacture of 1887-88.

As may be seen above, according to the convention the amount of the normal production of the factories adhering to it had been fixed. It was understood that all those who, in the 1887-88 season, would exceed this limit, must export this surplus abroad or keep it in stock during the year 1888, without being able to sell it on the home market.

It was in view of this arrangement that sales were effected abroad from the 1st December. The quantities of the production of the 1887-88 season exceeding the limit are valued at about two million pouds (32,000 tons), half of which has already been prepared for export abroad in January and February; there will then only remain a very small quantity (about a million pouds) to be sold for export, and foreign prices must rise considerably in order to allow of an exportation exceeding that amount.

It should be added that the beet-crop in Russia in 1887 underwent several sudden changes; at one time it was looked upon as lost, then it appeared better, later still it was thought that the factories would not even reach their normal out-turn, and this has been the case with some, while others have been more favoured, and the final result was a surplus of two million pouds.

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* 64,28 tons.

DIFFUSION IN LOUISIANA.

Paper read before the Planters' Association of Louisiana,
January 12th, 1888.

BY MR. WILLIAM GOLDING.

The question of diffusion *versus* the mill process for extracting the sugar from cane is again presented, and now, for the third time, during the last twenty years, for your consideration.

The fact, that former presentations were not entirely free of individual and corporate speculation, perhaps deterred many from giving the subject the consideration that its importance warranted.

The experiments now being conducted on the Magnolia plantation under the auspices of the Government, with a view of testing the merits of diffusion, will not fail to command the respect and confidence of every interest.

It is therefore the duty, as it is clearly the interest, of every sugar planter to investigate the subject fully while he may, that the matter may be fully and finally settled upon its merits.

It is especially important that the controversy should be settled during the present season, and by the present experiments.

The apparatus and all appurtenances are ample and complete, and there is no reason why a decision, conclusive and final, should not be rendered at the close of the present season—say February the 1st.

The fact that many planters are anxious to improve their equipment, either by mill or diffusion apparatus, renders it of the first importance that the decision should be prompt and decisive.

Having visited the Magnolia plantation and witnessed the experiments, and having subsequently conducted experiments with a view of verifying what I had seen, I am now of the opinion that the diffusion process should be adopted.

That the diffusion process will extract a greater proportion of the sugar from cane than can be extracted by the mill, is conceded by everyone who has examined the subject. Yet the question is always asked, will it not cost more to evaporate the water added than the extra sugar is worth?

Before answering this question, it will be necessary to ascertain the cost of fuel for producing sugar by the most improved mill process. An examination of the record will show that with the use of the best methods the mill process will extract one thousand pounds of sugar with a consumption of 1500 pounds of coal; or one and a half pounds of coal for each pound of sugar. Therefore, valuing the coal at one quarter of a cent per pound (23s. 4d. per ton), it is seen that the fuel expense by best mill process is three-eights of one cent per pound (1s. 9d. per cwt.) of sugar.

Assuming that in the diffusion process one-third the weight of the juice is added in water, the fuel expense will be increased in like proportions, and instead of one and one-half pounds of coal to the pound of sugar there will be two pounds; and the cost per pound of sugar by the diffusion process will be one-half of one cent per pound (2s. 4d. per cwt.) Whilst with the best mill process the cost will be three-eights of a cent per pound (1s. 9d. per cwt.) If, therefore, the average extraction throughout the State by the best mill process should be set down at 140 pounds per ton of cane, and the average extraction by the diffusion process be set down at 180 pounds—figures quite within visible bounds—the fuel expense will appear as follows:—

140 pounds sugar at three-eights per pound	$ 52½
180 ,, ,, one-half cent ,, ...	90
Extra cost of fuel..........	37½
Value of forty pounds sugar at five cents	2 00
Value of diffusion, per ton........................	1 52½

The foregoing is calculated on the assumption that the bagasse from diffusion will be used for fuel the same as in the mill process.

I have shown in a paper, read before this Association at the meeting of September last, that by adopting well known methods, no fuel other than the bagasse need be used in the mill process. And I am confident that the diffusion process, even with the addition of thirty per cent. of water, will, when perfected, make the crop with no other fuel than bagasse. The diffusion apparatus at "Magnolia" consists of twelve vertical tanks three and a half (3½) feet diameter and seven feet deep.

The cane chips are admitted at the top and discharged at the bottom. The tanks are placed around a common centre on a radius of 10 feet.

The apparatus is thus centralized, doubtless with a view to its installation in a small building.

The general arrangements and details of the apparatus are so faulty and complicated that a further description of it would contribute to no good purposes.

In view of which, I will describe an apparatus which I believe will meet all demands.

The apparatus will consist of twelve cast iron cylinders, 4 feet diameter and 8 feet long, which will be mounted up on suitable columns forming a continuous straight line.

The cylinders will be fitted with pistons and rods; the rods will pass through the cylinder bottoms and connect to as many small hydraulic cylinders placed underneath. The cane chips will be admitted and discharged at the top through a full-sized and rapidly adjustable cover.

MANNER OF OPERATING.

Cylinder number one is filled with chips, and the cover secured when water from an elevated tank is admitted to flow into the cylinder through an opening in the lower part.

Cylinder number two is now filled in the same way, and water from cylinder number one flows from an opening at the top, and is conducted by a pipe and enters the lower portion of cylinder number two.

In the same manner all of the cylinders are filled, and in same manner the juice flows from the top of one cylinder and enters at the bottom of the next.

When number twelve is filled, water pressure is applied to the hydraulic cylinder beneath number one, by which the piston now resting at the bottom of number one is forced upward, thus forcing the fluid out and into the adjoining cylinder, and at the same time expressing the fluid out of the bagasse.

The cover being now removed, the piston ascends and forces the chips out in a comparatively dry condition. The cylinder is again filled with chips and supplied with diffusing water.

The remaining cylinders are each discharged and filled in like manner, and so the operation continues as before described.

A heating coil is placed in the bottom of each cylinder by which the desired temperature is maintained.

It will be seen that by this process the water of diffusion flows through all of the twelve cylinders, and that no water whatever is wasted.

To appreciate some of the features of this apparatus, it will be necessary to understand something of the principle of diffusion. In connection with this subject the principle necessary to consider is as follows:—

If a quantity of sliced cane containing juice of a density of 8° Baumé be thrown into a vessel containing a quantity of pure water, equal in bulk to the juice in the cane, the average density would fall to 4° Baumé; but the actual density of the liquid, subject to the test, would depend upon the completeness of diffusion.

Here, then, is a problem.

Diffusion cannot remove all the juice stored in the cane, and it is doubtful whether if aided by time, other combinations might not form to defeat the desired object. Therefore, to effect complete diffusion it will be necessary to provide for mechanical compression of the cane while undergoing diffusion. To effect this result it will be part of the duty of the hydraulic cylinders mentioned.

Thus it will be seen that to effect complete diffusion it will be necessary to provide for perfect circulation, perfect distribution of the cane chips, and for mechanical compression, and for removing the water from the chips after diffusion—all of which requirements will be found in the apparatus herein described.

The cane cutter of Magnolia plantation is also defective, as not being provided with a fixed and regular feed, the work performed by it is very irregular and unreliable. There are fodder cutters used in the Western States which, with slight modifications, will cut the cane in a manner entirely satisfactory. These cutters can be furnished for about two hundred and fifty dollars each, two of which would be equal in capacity to the cutter at Magnolia.

Before closing this paper, I will call attention to a feature connected with diffusion which has not yet been mentioned, and which may become a pre-requisite to the process.

In one of my experiments, I sliced a quantity of cane, and placed it in a drying oven, and thus removed every vestige of moisture. I then re-saturated it and obtained a solution averaging 14° Baumé; while cane of the same quality diffused, without previous drying, yielded an average of 10° Baumé.

I think it quite probable that a large proportion of the juice in cane is not sufficiently matured for granulation, and when treated, as above described, the drying process becomes a refining process by which the juice is matured in a period of a few hours, as much as could be accomplished in as many weeks in the field, even with favourable weather.

I deem this feature of diffusion of great importance, and shall request those, who have the opportunity to do so, to make some inexpensive experiments in this line, and give the results at our next meeting. It is quite probable that in this process neither lime nor sulphur will be required in the after-treatment of the juice.

In the discussion which followed, Judge Rost asked if a record had been kept of fuel at Magnolia, to make a comparison between the diffusion and the mill process.

Mr. Wilkinson said they had not been able to keep the two separately.

Mr. William Golding said that fuel for mill or diffusion would be found to be about one and the same. It costs one pound of coal to evaporate one gallon of water. If bagasse could be used the cost of fuel by diffusion would be no greater than by the mill process.

Captain Lombard asked if all sugar was extracted from bagasse, would it be as good fuel?

Mr. Golding thought it would be better fuel.

Dr. Stubbs said he thought planters would find it more to their advantage to return the bagasse to the soil, than to burn it.

THE FRENCH REVENUE FOR 1887.

In a report to Lord Lytton (British Ambassador to France) issued last month, Mr. J. A. Crowe quotes from the *Journal Officiel* the French revenue returns for 1887, which, he says, enables them to test the prosperity of France, and measures the material progress of the country. It appears that the receipts from all ordinary sources in 1887 have exceeded the receipts of 1886 by 17,203,939f. (£688,156), but that they have fallen short of the amount estimated in the Budget by 23,897,663f. (£955,904). On the large item of "direct taxes" the income of 1887 is 777,320,600f., as against 767,073,100f. in 1886. Indirect taxes of all kinds have yielded 1886, 2,381,013,824f.; 1887, 2,398,217,763f. The increase, according to the estimates, should have been 41,101,602f. The deficit is, therefore, 23,897,663f., or little short of a million sterling in the ordinary Budget of the year. Among the items which have disappointed the calculations of financiers sugar is prominent, producing 44,500,000f.* less than the estimate, and

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* £1,780 000

12,421,500f. less than the receipts of 1886. Another item of the same kind is the registration tax, which displays a falling off of 7,000,000f. as compared with the estimates, and 4,500,000f. as compared with the returns of 1886. Stamps and salt show a slight increase. More important are the increases in the customs, spirits, railway fare taxes, and posts and telegraphs. But the advance in revenue from customs, 13,739,000f., is only attributable to the raising of the duties on cereals, which have produced enough to counterbalance losses accruing from higher duties on cattle, and leave a considerable surplus besides. The receipts from wines, spirits, and beer had been estimated to give 410,000,000f.; they gave 411,000,000f. Railway taxes were expected to produce 73,000,000f.; they produced 74,750,000f. Posts and telegraphs realised a plus of nearly 4,000,000f., but the estimates calculated on 9,000,000f. On the whole, it may be said 1887 has not yielded as much revenue as was hoped for, but the returns are not dangerously below the level of the estimates.

RELATIVE SPEEDS OF ATLANTIC MAIL STEAMERS, 1887.

Mr. Bell, the Superintendent of Foreign Mails in the Post Office Department at Washington, gives the following information regarding the speed of the Atlantic Mail steamers, which may be of interest to our readers:—

	Hours.
Cunard, "Umbria"	187·5
,, "Etruria"	188·0
North German Lloyds, "Trave"	199·3
Anchor Line, "City of Rome"	203·4
Guion, "Alaska"	205·3
North German Lloyds, "Aller"	205·7

Then come a number of North German liners with approximately equal times, the average of which nearly equals the time taken by the Cunarder "Aurania." Then follows:—

	Hours.
The Cunard, "Servia"	211·2
The White Star, "Britannic"	219·8
,, ,, "Germanic"	228·0
,, ,, "Adriatic"	230·0
,, ,, "Republic"	235·0
,, ,, "Celtic"	236·0

The best of the Hamburg American Line take 240·7 hours, whilst, almost at the bottom, stands the Inman Liners, the quickest of which—the "City of Chicago"—takes 241·6 hours; and the slowest—"City of Chester"—256·8 hours.

THE SUGAR BOUNTIES CONFERENCE.

House of Commons, February 23, 1888.

Mr. Burt asked the Under Secretary for the Colonies whether the International Conference relating to State Sugar Bounties would meet on the 5th of April next; when the papers which had been already promised relating to this subject would be presented to Parliament, and whether those papers would include the communications from foreign Governments received by the British Government subsequent to the adjournment of the Conference; whether he could give the House any information as to the views of the bounty-giving Governments which he had lately visited, viz., France, Belgium, Germany, and Holland; and whether there was ground to believe that this State bounty system, which had proved so injurious to many industries of this country, was likely to be brought to a termination.

Baron H. de Worms said that the sitting of the Conference, fixed for the 5th of April, would, he had every reason to think, take place on that date in London. Papers relating to the subject were now in the printer's hands, and would be circulated very shortly. They did not include the communications received from foreign Governments since the adjournment of the Conference, as those communications were not complete. The minutes of the Conference, together with the protocol and draft convention, were published in a special *Gazette* on the 23rd of December last, and would be placed on the table forthwith. The hon. member would, he was sure, see that it would not be advisable, in view of the fact that communications were now passing between the various Governments named on the subject of the bounties, and that the Conference would reassemble at an early date, to make a detailed statement of the personal communications that had taken place between himself (Baron H. de Worms) and the Ministers of the various Powers referred to, further than to say that the views which he conveyed to them had been most fairly received and fully considered, and encouraged a hope that a satisfactory settlement of the question might be arrived at when the Conference reassembled.

UNITED STATES' SUGAR REFINING COMPANIES FORMING "THE TRUST."

New York.

Havemeyers & Elder Sugar Refining Company.
F. O. Matthieson & Weichers Sugar Refining Company.
Brooklyn Sugar Refining Company.
Havemeyer Sugar Refining Company.
De Castro & Donner Sugar Refining Company.
Dick & Meyer ,, ,, ,,
Moller & Sierck & Co. ,, ,, ,,
North River ,, ,, ,,
Oxnard ,, ,, ,,

Boston.

The Standard Sugar Refinery.
Boston Sugar Refining Company.
Continental Sugar Refining Company.
Bay State ,, ,, ,,

Portland.

The Forest City Sugar Refining Company.

New Orleans.

The Louisiana Sugar Refining Company.
The Planters' ,, ,, ,,

St. Louis.

The St. Louis Sugar Refining Company.

The remaining sugar refining companies in the United States not in the "Trust" are:—

The Franklin Sugar Refining Company, Philadelphia (worked by Messrs. Harrison, Frazier & Co.)

The Delaware Sugar House, Philadelphia (worked by Messrs. E. C. Knight & Co.)

The Revere Sugar Refinery, Boston (worked by Messrs. Nash, Spaulding & Co.)

The American Sugar Refining Co., San Francisco (worked by E. L. G. Steele & Co.)

The California Sugar Refining Co., San Francisco (worked by Mr. Claus Spreckels.)

The *Times* Philadelphia correspondent, under date January 27th, in giving some account of American Monopolistic "Trusts"—the latest invention for controlling markets and maintaining prices—thus speaks of the "Sugar Trust":—

> The methods of a "trust" will be best understood by describing the Sugar Trust, which is to-day probably the completest of these combinations, although it does not include all the refining establishments. The object is to control both the production of refined sugars and the raw sugar market, thus regulating prices. Yet the formation of the combination is such that legal responsibilities are evaded. Mr. Bacon, of New York (Democrat), the Chairman of the Committee, expresses a doubt as to the ability to grapple with the question under the Federal Constitution. He mentions that an effort was made to break up the Sugar Trust in Louisiana, but the parties to it at once declared they did not reside in the State, and the Court was helpless. Then the Attorney-General of New York attempted to bring some of them to justice, but they pleaded that they exercised no corporate functions, and nothing more could be done. State Government machinery being powerless, Congress can now test the Federal legal powers on the subject. The capital of the Sugar Trust is $60,000,000, and the owners of the refineries who have gone into it have received certificates to fourfold their value—that is, for every $100,000 in actual value of the refinery, they have got $400,000 of stock. These certificates sell in the market at 80 for 100 par. This week the "trust," to limit sugar production, ordered the large New York Refinery of Moller, Sierck and Co. to shut down permanently, and their *employés* have been notified that they are going out of business. This is the fourth New York refinery that has been closed, being preceded by the North River, the Oxnard, and the Havemeyer Companies, all large establishments, now idle, that the "trust" has absorbed. In fact it has got possession of pretty much all the large refineries in the United States, the only ones now independent being Nash, Spaulding and Co., of Boston; and Harrison, Frazier and Co., and E. C. Knight and Co., of Philadelphia. These houses are in the field to combat the "trust." The latter is to some extent handicapped by the necessity of making dividends on stock that is three-fourths "water."
>
> The sugar merchants are naturally opposed to the "trust," but they are said generally to be afraid to speak lest they be crushed. In New York it makes a very peculiar condition of the sugar market. The "trust" works secretly, fixes prices, and dictates the demand for raw sugars, both as to the time of development and the amounts to be handled. Against this secret power are the importers, now beginning to receive the new crop, yet all working independently and without concert of action in meeting the single buyer, to whom they must submit their cargoes, or else seek custom from the three outside refineries yet independent of the "trust." Without opportunity to secure healthy competition, and unable to fathom the one buyer's plans, the uncertainty of the market causes almost complete stagnation, excepting when the "trust" may think it politic to buy. This condition of affairs is not pleasant to contemplate, and when the same sort of thing permeates the whole of the markets, and also affects petroleum, lard, spirits, coals, and a dozen other staples, it is no

wonder there is an outcry. The "free breakfast table" is in danger not only in the sugar bowl but also in the cream jug, for Boston announces the incipient stages of the formation of a Milk Trust, the New England Milk Producer's Union being now in session there for that alleged purpose. Even the American's favourite beverage of ice water is threatened. An Indiana member in great alarm told the House that the ice dealers of his State had combined and were demanding £2 per ton for ice which only cost 6s. to cut and store. It is evident that Congress will have plenty to do if the investigation is thorough, and that the movement has begun none too soon.

MR. GIFFEN ON OUR FOREIGN TRADE.

The *Board of Trade Journal*, for February, contains an interesting report prepared for the Board by Mr. Robert Giffen, on competition with the foreign trade of the United Kingdom. This report will be presented to Parliament before long, with the elaborate tables on which it is based. Only summaries of these tables are given in the *Journal*. The statistical information they convey is encouraging, on the whole, since it indicates that the popular impression that the trade of Germany and other countries are gaining ground everywhere at the expense of English trade is erroneous. Even the German expansion, from which most is feared, is chiefly in exports to countries of minor importance. Mr. Giffen's concluding remarks are as follows:—

"Whatever the changes in proportion, therefore, the amount of the exports of the countries mentioned taken altogether has increased quite as much to the United Kingdom as to any of its competitors. The fact that the increase in the amount to the United Kingdom is not larger than to the others, whereas the exports from the United Kingdom to such countries have increased more largely than those of its competitors, would seem to argue a change in the currents of trade in the direction of the United Kingdom becoming less an *entrepôt* than it was, a change that is believed to be going on owing to the Suez Canal and other changes in shipping; but there is nothing in this fact to indicate any weakening in the hold of the United Kingdom upon the export trade of the world in comparison with its chief competitors, which is shown by the first set of tables."

RECENT IMPRESSIONS IN AUSTRALIA.

By Lord Brassey.

A very full meeting of the members of the Royal Colonial Institute, on February 14, was held in the Whitehall Rooms of the Hôtel Métropole, to hear a paper read by the Right Hon. Lord Brassey on the subject of "Recent impressions in Australia."—The Right Hon. the Earl of Dunraven presided, and among those present were the Right Hon. Sir John Rose, Sir Frederick Young, Rear Admiral Sir George Tryon, Sir Daniel Cooper, Colonel Sir Francis de Winton, Sir Henry Barkly, Sir John Coode, Captain Colomb, M.P., Sir Charles Mills, Sir Francis Villeneuve Smith, Sir Arthur Blyth, Sir James Garrick, Sir Charles Adams, Sir W. C. Brooks, M.P., and Lieutenant-General R. W. Lowry.

Lord Brassey began by referring to the rates of pay existing in Australian Colonies. Wages on the West Australian railways were at an almost uniform rate of 10s. a day for all classes of workmen. Mere lads were earning this high pay as platelayers, and their general physique was remarkable. At Newcastle, the great port for the shipment of coals from New South Wales, the wages of the underground men averaged from 10s. to 12s. for a day of eight hours. This field of employment had been rapidly developed, 3,180 men now being employed in the collieries, and considerably over 2,000,000 tons of coal were annually shipped. The gold fields had afforded another well paid but arduous employment in Australia. At the mine of Mount Morgan, near Rockhampton, the men employed in quarrying earned from 7s. 6d. to 8s. 6d. per day, though mostly new arrivals in the Colony. They worked on an average eight hours a day, and the cost of living was 15s. a week. Colonial seamen, too, shared with their fellow workmen on shore in the advantages of high wages—the sum paid in Australian ports to able-bodied sailors being about £6 a month. In domestic service wages were beyond all comparison in excess of those obtainable in Europe, and servants were treated with the utmost kindness and consideration. At Sydney, in all industrial establishments, workmen earned from 8s. to 14s. a day, for a day's work of eight hours. The favoured lot of the urban populations of the Australian Colonies was established by many evidences. The great majority of the working classes in the great cities owned the houses which they occupied, and the wide spaces of garden and the broad road, were in striking contrast with the overcrowding seen at home. In addition to their high wages the artizans commanded in a great degree the old world opportunities of primary and of higher education. Excellent primary schools were maintained by the State, and the higher education had been provided for by the establishment of Universities at Adelaide, Melbourne, and Sydney. The Colonies were devoting their resources liberally to the acquisition of works of art and to the formation of public libraries, no less than 229 libraries and institutes being established in the towns and villages of Victoria; while the amount provided at Sydney by private bequests and public contributions for the purchase of works of art had already exceeded £30,000. With all these resources the reluctance exhibited by the inhabitants of the great towns to push their way into the interior was not far to seek, for in the country the dwellings were, as a rule, very primitive, and the conditions of existence rough and hard. If the demand for labour was fully supplied in the cities, in the vast regions of the interior the space as yet unoccupied was practically illimitable. Western Australia comprised a territory equal in extent to 18 times that of England, and with a population equal to that of Dover. Steps should be taken to encourage colonization; but the price of 10s. an acre for land, as fixed by the Government of Western Australia, seemed a heavy demand on settlers without capital, as contrasted with the advantages offered by Canada and the United States. As to the value of the Colonies as a market for the productions of labour employed in the factories at home, a few figures as to English Colonial investments were interesting. It was estimated that in Government loans had been invested £150,000,000; in railway and harbour works, £10,000,000; and in banking and financial enterprises, £120,000,000. From these investments a sum of more than £14,000,000 was annually received in the form of interest. The figures showed how wide a field had been opened for the investment of capital, which could with difficulty be employed with equal advantage at home. The interest of the Colonies in the connection with the British Empire might be illustrated by reference to every department of the affairs of the State. It was eminently obvious in relation to diplomacy, and was not less so in relation to naval defence. In the organisation of their land forces, although the assistance from home had been comparatively slender, it had been of no small advantage to the Colonies to obtain the services of Imperial officers; while turning to the great profession of the law, the Imperial connection was of especial value in insuring the uniformity of decisions. It might be difficult to frame plans for closer federation; but something was gained if its desirability were admitted.

The discussion which followed was opened by Admiral Sir George Tryon, and continued by Sir James Garrick, Captain Colomb, M.P., Sir John Coode, and Captain Henderson, R.N.

Lord Dunraven, in closing the discussion, said that as to the difficult and complicated question of emigration, his own opinion was, speaking generally, that it was not wise for a State to interfere in such matters of that kind—the endeavour to bring about a great transportation of its inhabitants to a colony. He believed that these matters tended to adjust themselves. If the Colonies required labour they would offer inducements to draw it from the quarters where it was overabundant. (Hear, hear.) The working people of this country were ready to emigrate if they felt that they were likely to better themselves by doing so, and understood that they could not make a decent living at home through no fault of their own. But too much State interference was apt to engender in their minds the idea that they were being cajoled into emigration not so much for their own good as for that of some other class. (Cheers.) On the other hand, to diminish friction, to make communication easy, postal communication cheaper, and to bring the Colonies nearer to the mother country, and so to minimise the difficulty and painfulness of emigration, was one of the most important subjects to which statesmen at home and in the Colonies could address themselves. As to the question of federation, he believed it would be a very foolish thing to attempt to formulate any plan at present. Plans for giving the Colonies a voice in large Imperial questions of defence, the safeguard of our waterways, and the representation of the Colonies in some Council sitting in London, were all matters which he was very certain would evolve themselves, provided only that the interest and desire for such a state of things were uniformly felt. The only thing which he could see which could interfere with the tendency towards cohesion was the possibility of divergencies arising between the Colonies and the mother country on commercial matters. He believed that in the long run a community of interests in trade would determine the fate of the Empire. (Hear, hear.) If the importance of developing the resources and purchasing power of the Colonies were thoroughly understood at home, he had no doubt as to the stability and increasing closeness of the union between the Colonies and ourselves. (Hear, hear.) But he dreaded the possibility of its becoming more advantageous to some Colonies to give more favourable terms in trade to a foreign country than to Great Britain; but that event he believed could never come about except by the absolutely unyielding manner in which the people at home adhered to their present ideas of fiscal and commercial policy. The British Empire had no temptation to aggression; its mission was one of peace and commerce, and those who earnestly desired its consolidation would devoutly wish statesmen to recognise that the importance of such a consummation was worthy even of a sacrifice of what they might believe to be, under ordinary circumstances, sound politico-economical views. In that question the whole future of the British Empire must be decided. (Cheers.)

PROSPECTUS OF THE JOURNAL *LE STAZIONI SPERIMENTALI AGRARIE ITALIANE.*

Published by LOESCHER & Co., Via del Corso, Roma.

Since 1871, in imitation of what had been done in Germany, it was proposed in Italy to publish in the form of a journal an account of the work done by the numerous agricultural stations founded by the Italian Ministry of Agriculture.

This proposal came from the agricultural ministry, and was warmly seconded by the Congress of the Directors of Italian Agricultural Stations, in December, 1871. According to the resolutions then taken, each agricultural station was to publish its own annual report; but all were to contribute to the new journal, the editor of which, proposed by the votes of the directors of the stations, was to be named by the Minister of Agriculture. The first editor was Professor Alfonso Cossa, then director of the agricultural station of Turin.

Under the editorship of Prof. Cossa, the journal was first published in 1872, with the title of *Le Stazioni Sperimentali Agrarie Italiane.* It continued till 1882, when Prof. Cossa, called to another post, withdrew from the direction of the Turin laboratory. Thus, after eleven years of useful activity, the Italian Agricultural Stations' Journal suspended its publications.

The want of this journal was soon felt. In the congress of Italian agricultural chemists, held in Rome in November last, the Minister of Agriculture put the question of resuming the publication of the journal of the agricultural stations, and of electing an editor for two years. The congress was unanimous in voting the republication of the journal, to be placed under the patronage of the Ministry of Agriculture. The congress moreover expressed the wish that, besides being simply the journal of the work done in the Italian agricultural stations and agricultural-chemical laboratories, it should also publish a more or less extensive summary of all the other agricultural-chemical work done both in Italy and in foreign countries, and a short account of the more important scientific investigations in the sciences connected with agriculture.

The good-will of my colleagues, and of the Ministry of Agriculture, has placed in my hands the editorship of the newly re-established journal. In accordance with the resolution of the above named congress, I purpose that the contents of the journal should be as follows :—

1. Original papers on the more important scientific work done in the agricultural stations and agricultural-chemical laboratories of Italy.

2. Annual summaries of the work done by each of the Italian agricultural stations and agricultural-chemical laboratories.

3. Reviews, as complete as possible, of all the agricultural-chemical publications, and accounts of all the more interesting scientific investigations connected with agriculture, in Italy and in foreign countries.

4. Accounts of the proceedings and resolutions in the meetings and congresses of the directors of agricultural stations and of agricultural-chemical laboratories in Italy, and in foreign countries.

5. Government decrees and resolutions, and all other changes, regarding agricultural stations and agricultural-chemical laboratories in Italy, and regarding the staff therein.

6. Accounts of the modifications in foreign agricultural stations and agricultural-chemical laboratories.

7. Reviews and announcements of books and periodicals sent to the editor.

Special care will be taken in summarising papers and reviews. These summaries will propose to give an exact account not only of the results of research, but also of the methods used in the research. In some cases parts of the papers reviewed will be published, and the figures and drawings reproduced.

For the synthetical review of scientific investigations connected with agriculture, I shall have the help, not only of my colleagues in the agricultural stations, but also of other Italian specialists in agricultural sciences.

For the agricultural-chemical reviews, to be more extensively written, I have secured the special help of my colleagues—Prof. Dr. Carlo Besana, director of the Royal Dairy Agricultural Station of Lodi; Prof. Italo Giglioli, director of the agricultural-chemical laboratory in the Royal Agricultural College of Portici; Prof. Dr. Francesco König, director of the Royal Agricultural Station of Turin; Prof. Mario Zecchini, C.E., director of the Royal Enological Station of Asti.

The help of the Italian Ministry of Agriculture will be of great importance to the journal, for all government publications, both Italian and foreign, will be given to the journal for perusal and review.

The old title of *Le Stazioni Sperimentali Agrarie Italiane* will be preserved. The first new number will appear early in 1888, preserving the same form (similar to that of this prospectus) as in the older series. Six numbers are to appear yearly, forming a volume of at least 500 pages. The publication will be, approximately, every two months.

The annual subscription is of 12 francs, in Italy; and 15 francs in foreign countries. The subscriptions have purposely been kept very low, in order to favour the diffusion of the journal.

In order to connect the new series with the old series of *Le Stazioni Sperimentali Agrarie Italiane*, two volumes will be published, in which is to be given an account of the work done by the Italian agricultural stations and agricultural-chemical laboratories during the five-year interval 1883-87. These volumes are to be sold at a price corresponding to the cost of publication to those who possess the complete collection of the journal till 1882, and who subscribe to the new series, or consent to exchange it with their own periodical publications.

Taking, therefore, into account the two volumes that are to be published, the numbers that are to appear in the coming year will form the XIV. Volume of *Le Stazioni Sperimentali Agrarie Italiane.*

Prof. PASQUALE FREDA,

Director of the Royal Agricultural-Chemical Station in Rome.

Rome, 8th December, 1887.

MR. DAVID CHADWICK ON THE EXPENDITURE OF WAGES 1839 TO 1887.*

Paper read at the British Association Meeting, Manchester, 1887.

After an introductory reference to papers previously read on the same subject in 1859 and 1861, Mr. Chadwick said:—I propose to compare the actual present expenditure in food, clothing, rent, and sundries in 1887, and to show what the same items cost in 1859, 1849, and 1839. My investigations will therefore show the difference in the amount of necessaries, comforts, and luxuries which an average workman, earning 30s. a week, and having a wife and three children to support, can now obtain, as compared with those which a similar workman, with the same wages, could have obtained in 1839, 1849, and 1859. I have taken the case of a working man with a wife and three children of the respective ages of about seven, five, and two years, and having an average income of 30s. per week all the year round. I have made numerous personal inquiries, and have obtained carefully prepared returns from upwards of fifty localities, by persons who have verified and signed the statements, as the actual expenditure in their respective districts. The following is a summary under each head:—

Articles.	Cost in 1887.		Cost in 1859.		Cost in 1849.		Cost in 1839.	
	s.	d.	s.	d.	s.	d.	s.	d.
Bread, flour, and meal	4	8¾	5	4	5	8	7	6
Butcher's meat and bacon	3	11½	4	0½	4	5	4	0½
Potatoes, milk, and vegetables	4	6¼	4	3	4	3	4	3
Groceries, coals, &c.	5	3	6	11	7	1½	8	9½
Rent and clothing	7	6	7	0	7	0	7	0
Sundries	2	5½	2	5½	2	5½	2	5½
Total cost in each of the four periods	28	5	30	0	30	11	34	0½

If the total expenditure of 30s. in 1859 be taken as a standard, it will be seen that the same articles cost 4s. 0½d. more in 1839, 11d. more in 1849, and 1s. 5d. less in 1887. The same quantity of bread, meal, and flour consumed by the family costs in 1887 4s. 8¾d., whilst in 1839 it cost 7s. 6d., being a difference of 2s. 9¼d. per week. Butcher's meat and bacon cost in 1887 3s. 11½d., and the cost was 1d.

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* This has been, from the want of space, held over since October.

more in 1859 and in 1839. Potatoes, milk, and vegetables cost in 1887 4s. 6¼d., as compared with 4s. 3d. in 1839. Coffee (½lb.) costs in 1887 7¼d., and in 1839 it cost 1s. Tea (¼lb.) costs in 1887 6½d., and in 1839 it cost 1s. 6d. Sugar (3lb.) costs in 1877 6d., and in 1839 it cost 1s. 9d. Rice (2lb.) costs in 1887 4d., and in 1839 it cost 8d. Butter (1lb.) costs the same in 1887 as in 1839, viz., 1s. 1d. per lb., but butterine or margarine, which is much used, can be obtained at about one-half this price. Treacle (2lb.) costs in 1887 4d., in 1839 it cost 8d. Soap (1½lb.) costs in 1887 4½d., in 1839 it cost 7½d. Coals and candles cost the same in 1887 as in 1839, but at the present time petroleum lamps are much used instead of candles, and petroleum oil costs only about half the amount. Rent, taxes, and water in the Manchester district cost on an average 4s. 6d. in 1887, as against 4s. in 1839. This item is very variable. Apartments or lodgings in London and the Metropolitan district in 1887 for three rooms on an average may be taken at 6s. per week, and for two rooms 5s. per week. For a cottage with four small rooms in the manufacturing district of Lancashire the average rent is 4s. 6d. per week. Clothing is taken at 3s. in the two periods, but the quality of clothing is in many cases superior in 1887 to that of 1839. Sundries include medicine, school fees, subscriptions, &c., and are taken at the same amount in each of the four periods. The less cost of 1s. 7d. in 1887 over 1859 affords a little extra for amusements and savings.

In many of the returns which I have received, especially from populous towns and districts, it is shown that a large number of the working class belong to co-operative stores or local clubs, and that they now obtain many of the principal articles of food and clothing at reduced prices, which, as compared with the prices of the shops, give them an advantage of about 10 per cent. Taking the actual reduction in the cost of living in 1887, as compared with 1859, the total saving would be, as per table, 1s. 7d.; and, as the cost of the same articles in 1839 was 4s. 0½d. more than in 1859, the present cost of living in 1887 is 5s. 7½d. per week less than in 1839; or in other words, the workmen in 1887, as compared with 1839, have 5s. 7½d. more to spend or to save than similar workmen had 50 years ago. In regard to the amount of wages, I have been reminded that Mr. George Lord, in 1885, published a paper in which he stated that the wages of operatives engaged in cotton spinning showed an average increase between 1850 and 1883 of 35 to 75 per cent., and that the wages of weavers had increased 67½ per cent. in one mill, and 83½ per cent. in another mill. But Mr. Lord appears to have made this statement from a very limited inquiry, and Mr. Samuel Ogden has proved that it is incorrect and misleading. My figures show an increase of only about 10 per cent. The average workman of to-day is equal in skill and industry to the workman of 50 years ago, and in point of education and intelligence is much superior. This improved education has brought new requirements and habits. He is now a voter and has some power in the State. He reads the newspaper daily, and enjoys at home the luxury of one or more weekly papers and periodicals. He has learned to better appreciate and use the power of Trades Unions, the value of Co-operative Stores, and the importance of providing for the education of his children, and for the requirements of health and the contingency of sickness, and he now requires better lodging and better food.

The Board Schools are now giving the future workmen a higher standard of education, and when he has acquired that technical education now so much desired, his wages must be still further increased to meet the gradual but continuously increasing requirements of his improved position. The educated workman will soon require that all the most laborious parts of manufacturing and mining operations shall be done by machinery. His appetite and tastes are more refined and expensive, his wife has learned or is learning the best modes of cooking, and he now requires and gets home comforts, which men in his position fifty years ago could seldom find at home. The home enjoyments of the British workmen in 1887 compare favourably with those of the workmen of America, France and Germany. We may expect that the workman twenty years hence will be a much superior person than he is now. He is at present more than equal to his employer in the power of combination, and he has learned how to claim and exact more wages for less hours' work in all trades where the masters are known to get large profits. This is particularly the case in all branches of the building trades in London and all large towns, and in many manufacturing trades in Lancashire and Yorkshire. The workman during the last fifty years has boldly set at defiance that old dogma in political economy relating to the "Wage Fund." He says in effect "your capital and superintendence and my labour make the profit, and I claim to have my fair share." The workmen now understand and apply in many cases the law of supply and demand better than the masters. When the supply of labour exceeds the demand, they withdraw a portion of the supply, or suggest the working of "short time" during the depression. The wages of coal workers generally are now lower than during the last thirty years. The collier's labour is harder, and the risk of life greater, and his share of the comforts of life smaller than any other class of workmen. And this, in a trade subject to no foreign competition, and where the last ten years' depression in prices is, from the workmen's point of view, due solely to a culpable disregard of the law of supply and demand by coal owners and their lessees.

In my former review of the wages paid in 1859, as compared with 1839, I remarked "that in 1859 the low prices of provisions and clothing, together with the high rate of wages and the facilities for education and mental culture, have placed within the reach of the working classes more physical comforts, and the means of obtaining more social and intellectual enjoyment, than at any previous period." I venture to think that in 1887 it is a matter for congratulation that all those advantages have been further increased since 1859, when the above was written; and that although it may be a question whether wages have received more or less than an adequate share of the enormous increase of wealth which has been the result of our trade and commerce during the last 50 years, it is satisfactory to find that the improvement in the position of the working classes has been so great, and that it is likely to be generally permanent, and in many cases progressive. The retrospect of the last 50 years must on the whole be considered satisfactory, and to afford not the least of the many subjects for congratulation in this Jubilee year.

SACCHARINE-COCOA.

From the *Chemische Zeitung* (Cöthen).

The firm of Sprüngli and Son, of Zürich, is bringing into the market a non-oleaginous Saccharine-Cocoa which is likely to come into extensive use in cases of diabetes, obesity, and catarrh of the stomach. Saccharine-Cocoa is an extremely fine, yellowish-brown powder, very soluble, and the solution has an agreeable taste, owing to the presence of saccharine, consequently possessing a slightly acid reaction. The product has no after taste, owing to the addition of a small quantity of some aromatic substance. A microscopical examination of several samples showed no trace of any addition of farina, and there was no indication of artificial colouring-matter.

Chemical analysis gave the following results:—

	Per cent.
Moisture, ascertained in platinum dish at 110° C.	3·80
Ashes, treated with Carbonate of Ammonia after red heat	6·45
Fat	28·78
Total Phosphoric Acid (calculated on total ash)	16·88
Saccharine	0·76

The ash remained dry on exposure to air, and showed no metallic impurities, such as copper or lead.

In judging the proportions of ash and phosphoric acid, it must be specially remembered that we are dealing with a preparation of cocoa which has to a large extent been deprived of its fatty constituents.

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. Thompson, C.E., F.C.S., M.I.M.E., Patent Agent, 6, Lord Street, Liverpool; 6, Bank Street, Manchester; and 323, High Holborn, London.

ENGLISH.

APPLICATIONS.

17289. J. Tomlinson, London. *Improvements in apparatus for trashing and cutting sugar cane and such like crops.* (Complete specification.) 15th December, 1887.

17696. J. W. Bailey and J. A. R. Greaves, London. *The production of a new or improved saccharum for the use of brewers, distillers, and vinegar makers.* 23rd December, 1887.

17793. W. P. Thompson, Liverpool, London, and Manchester. (Communicated by J. H. Man, U.S.) *Improvements in apparatus for extracting the juice from cane, sorghum, and other like substances.* 27th December, 1887.

18025. G. Adant, London. *Improvements in the method of, and apparatus for grinding and œrating sugar, grain, and the like.* 31st December, 1887.

642. E. Easton and S. Hoyland, London. *Improvements in apparatus for extracting juice from sugar cane.* 14th January, 1888.

1392. B. E. R. NEWLANDS and J. B. ALLIOTT, London. *Improvements in apparatus for filtering saccharine or other liquids or solutions, and appliances for cleaning the said apparatus.* 30th January, 1888.

1400. A. E. KITSON and B. HOLMES, Middletown, Skipton-in-Craven. *Improvements in connection with boxes for storing and pulverizing salt, sugar, and like granular substances.* 31st January, 1888.

1528. C. D. ABEL, London. (Communicated by E. Kiderlen, J. W. Van Leenhoff, A. Wernicke, A. Wilhelmi, and A. Köhlmann, Germany.) *Process for the preparation of materials containing starch for direct treatment in brewing processes, the production of malt and other saccharifying processes.* 1st February, 1888.

1752. A. CHAPMAN, of the firm of Fawcett, Preston & Co., London. *Improvements in apparatus for evaporating saccharine or other solutions or liquids.* 6th February, 1888.

2367. J. MARX, London. *Improvements in the method of and means for separating matters in solution by osmose, dialysis, or diffusion, or by electrolysis, or by a combination of those processes.* 16th February, 1888.

2372. C. D. ABEL, London. (Communicated by E. K. J. W. Van Leenhoff, Holland; A. Wernicke, A. Wilhelmi, and A. Köhlmann, Germany.) *Improvements in the process for the production of beer, maltose, and other products of fermentation or saccharification by the aid of centrifugal action.* 16th February, 1888.

GERMAN.

ABRIDGMENTS.

32862. T. H. SCHWARZER, Leipzig Reudnitz. *Sugar bonbon cutting machine.* 18th June, 1886. By means of this machine the round rolled sugar sticks which are still warm and soft are cut into bonbons. The main parts of this machine form four rows of knives, of which the lower one is fixed, whilst the upper one is moved vertically, and the lateral one horizontally. For the purpose of moving the lateral knives, flat springs having the form of a loop are fixed at one end round a pin on the holder of the lateral knives, and at the other end on the sides of the pull rod of the upper knife. Springing rods are also used to bring back the lateral knives to their initial position.

34705. F. DEMMIN, Berlin. *Apparatus for the liquoring of sugar blocks, segments, plates, cubes, or loaves, as well as of pulpy sugar masses and other crystalline products.* 20th January, 1885. In order to leave the cleare in the liquoring of sugar blocks in the centrifugal time to distribute itself in the sugar mass, but not to make its way through the loose parts of the block, and thus to become practically useless, the sugar molds are placed in a clearing box which surrounds them closely, and connected firmly with the centrifugal. This box possesses a sieving side, behind which is the back part, provided with a sliding valve, closing it from time to time. The cleare is led from a central vessel into the clearing box by means of radial pipes.

36335. F. O. Matthiessen, Irvington, N.Y., U.S.A. *Improvements in continuous working filters for sugar juices.* 27th October, 1885. The contrivance for the removal of the bone black that has already become impure consists of two perforated discs moving one upon the other, and the openings of which are so arranged that only a small number coincide at one time. The impure bone black is removed from the apparatus by means of two archimedean screws—one vertical and the other horizontal.

36595. Metal Works: A Joint-Stock Company in Neustadt-Magdeburg (formerly J. Aders). *Improvements in vertical evaporating apparatus for sugar and other juices.* 18th December, 1885. Below, or above, the well-known central and very wide boiling or circulating pipe in the evaporating apparatus, with vertical heating tubes, is a centrifugal pump with vanes or blades; or, in its stead, a transporting screw is fixed inside the circulating pipe. The motion thus produced propels with certainty and great velocity the juice downwards in the heating tubes at the periphery. The evaporation is accelerated by this active circulation of the juice.

36851. R. Englert and F. Becker, Prague. *Discolouring and purifying sugar juices by means of hydromonothionic acid, or its salts and process employed therefor.* 31st January, 1886. One per cent. of the said salts is added to the separated juice saturated to an alkali of 0·04 per cent. The juice is saturated to 0·02 per cent. boiled, and the mud separated by means of filter presses; the juice is then boiled to rob, to which are added from 2 to 4 per cent. of salts and 1 to 2 per cent. milk of lime. The rob thus treated is saturated to 0·03 per cent. of alkalinity, boiled, and the mud separated by means of filter presses.

36842. G. A. Hagemann, Copenhagen, Denmark. *Process for liquoring sugar by means of acid.* 15th November, 1885. The finished crystals of beetroot sugar are cleared with sulphuric acid, which has been diluted by means of colonial syrup in the proportion of 4 kilogs syrup to 60 cubic centimetres of acid for the purpose of depriving them of their bad smell and taste.

36848. LUDWIG JANKA, Mödritz, Mähren. *Improvements in osmose apparatus.* 23rd March, 1886. For the purpose of increasing the osmose service, undulated or fluted osmose paper is applied, and the apparatus are accordingly provided with corrugated or fluted joints.

36850. F. W. HERING & Co., Osterfeld and Halle-on-the-Saale. Sixth patent of addition to No. 16373. *Improvements in the machine protected by the latter patent for the washing of potatoes, beet-roots and the like.* 8th December, 1885. The turning or stirring vanes of the machine are now formed like plough shares for the purpose of preventing the potatoes from getting spoilt. Around the sieve bottom of radiating bars is a gutter in which the stones collect. The brushes which assist the washing process are placed in pockets of the vertical massive or latticed walls of the washing vat. Lastly, the flap valve sunk in the sieve bottom is replaced by an eccentric slide.

36832. KONRAD TROBACH, Berlin. *Process and apparatus for the draining of beet root slices, spent beet roots, beet root raspings and other saccharine raw materials by means of the vapour of alcohol or methyl-alcohol.* 31st January, 1884. The beet root slices are drained by allowing them to be penetrated throughout by vapours of alcohol, having a high percentage, which carries off the water, and the sugar is extracted by hot alcohol. A solution of sugar is thus obtained in almost pure alcohol, whilst the parts which do not form constituent elements of the sugar remain, owing to their insolubility in alcohol in the substance forming the cells of the beet slices, which fact renders the latter more valuable for cattle food. The alcoholic sugar solution flows through a lime filter for the purpose of neutralising it, and collects in an alembic in which the alcohol is distilled off the liquor, for the purpose of being used again in continuous working. The alcohol which remains in the beet is expelled and recuperated by means of steam.

36839. F. O. MATTHIESSEN, Irvington, N.Y., U.S.A. *A process for the filtering of sugar solutions and improvements in the apparatus used for this purpose.* The sugar solutions flow in an upward direction through a column of bone black, from the bottom of which the part of bone black already used and charged with impurities is constantly removed by means of a scraping or throwing contrivance. This contrivance consists of a rotating disc provided with radial slits, covered by sharp edged rectors. There is only one sharp edged side so disposed as to cut a helical segment from the column of bone black. The disc is moved by a worm and worm wheel. The scraped bone black is raised by means of a kind of Paternoster conk above the level of the juice. The juice flows through several rows of small apertures into a gutter surrounding the filter.

36745. Hermann Kraensel, Breslau. *Filtering apparatus with constant filtering surfaces for saturated sugar juices.* 20th September, 1885. The apparatus consists of one or several filtering chambers, having a wedge-shaped form, and possessing each two filter plates provided with the usual filtering cloth, the discharge canals and the mud collector, the manhole of which is covered with a filtering plate. For the purpose of washing out the mud which is deposited in the collector during the filtration of the sugar juice from inside to outside, the collector is provided with an injection-pipe and a revolving device to stir the mud.

36840. E. E. Quimby, Orange, New Jersey, U.S.A. *A device for the removal of spent bone black from bone black filters.* 27th October, 1885. The device for those continuous bone black filters in which the filtration takes place in the upward direction (see previous patents) consists of a grate, to which a shaking motion is imparted by two eccentrics. The grate has bars laid edgeways, which are provided at the top with oblique projections, similar to knife edges, for the purpose of scraping the charcoal charged with impurities.

36849. F. O. Matthiessen, Irvington, N.Y., and E. E. Quimby, Orange, New Jersey, U.S.A. *Improvements in bone black filters for sugar juices.* 27th October, 1885. The improvement relates to filters in which the sugar juice is filtered in the upward direction, and has for its object to insure the flow of the juice both at the periphery and through the centre, so that the mass of animal charcoal is uniformly penetrated. For this purpose the layer of charcoal at the height of the gutter is traversed by a great number of parallel gutters or troughs, which are covered with sharp-pointed roof-like appliances for the purpose of retaining the charcoal.

36919. F. A. Bungatz, Cologne-on-the-Rhine. *Cutting contrivance for machines for the preparation of sugar sticks.* 10th January, 1886. The contrivance is adapted to a machine in which three rollers working together, and two of them having thin bevelled edges in contact, leave between themselves a triangular space, into which the soft sugar mass is pressed to form a bar or stick of sugar of triangular section. Of course this section may be of a different sort. A fall hammer is gradually lifted by a cam, which falls at regular intervals on the the sugar rods, and cuts it into pieces of equal length.

36923. R. C. Howes, East Orange, New Jersey, U.S.A. *Device for the removing of spent bone-black from continuous charcoal filters.* 9th February, 1886. This device, by means of which the lower layers of the spent charcoal are constantly removed (see the previous Patents of Matthiessen and Quimby), consists of a sort of species of conic-spiral knife edge, fixed on the arms of a supporting frame, and rotating slowly with it. The charcoal falls between the knife edge blades towards the inside.

36994. M. M. Rotten, Berlin. *A process for the separation of lime from strontia.* 6th January, 1885. The wash lyes resulting from the removal of sugar from molasses by means of strontia, into which the whole contents in lime of the impure strontia pass, can be freed from the greater part of their lime by treating them with an insufficient quantity of carbonic acid gas (saturating gas from the burning of lime or strontianite). The wash lyes are therefore saturated in parts. A precipitate is formed which consists for the most part of carbonate of calcium (by trial 85·8 per cent. Ca O to 142 Sr O.) A further saturation gives a carbonate of strontia poor in lime (82·4 per cent. Ca O to 17·6 per cent. Ca O), which worked afresh can be applied to the extraction of sugar from molasses. For the success of the operation the lye must be diluted down to 15 degrees Brix, and the saturating gas must not be too rich in carbonic acid. The saturation takes place until the alkalinity throughout has fallen below the lime alkalinity which was previously ascertained, then the lye is boiled and the precipitate filtered afterwards.

37187. F. O. Matthiessen, Irvington, N.Y., U.S.A. *Improveprovements in contrivances for the removal of charcoal from continuous working charcoal filters.* 9th February, 1886. The contrivance consists here (see previous Patent, 37186) of flat grate bars, having at their lower part the form of a vane, and are provided on their whole length with a slit. They are set in a state of oscillating motion by means of a pull rod common to all the bars and of the cranks with which these bars are provided.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO 31ST, 1887-1888.

Board of Trade Returns.

IMPORTS.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1887.	1888.	1887.	1888.
	Cwts.	Cwts.	£	£
Germany	477,041	376,939	262,378	295,720
Holland	20,213	33,564	11,285	23,784
Belgium	128,905	80,983	67,169	59,999
France	1,534	1,005	900	999
British West Indies & Guiana	296,463	134,809	228,849	132,327
British East Indies	7,100	54,187	3,100	29,997
China and Hong Kong	....	....	....	....
Mauritius	8,000	5,200	3,450	3,000
Spanish West India Islands	....	....	....	....
Brazil	56,830	209,114	30,925	147,590
Java	306,424	548,567	204,315	451,561
Philippine Islands	33,802	61,900	14,286	30,795
Peru	39,832	95,720	25,020	75,447
Other Countries	82,571	39,626	43,674	26,771
Total of Raw Sugars	1,458,715	1,641,614	895,351	1,277,990
Molasses	....	....	3,122	4,565
Total Raw Sugars	....	....	898,473	1,282,555
REFINED SUGARS.				
Germany	164,764	293,158	129,531	260,569
Holland	88,096	118,283	69,830	111,228
Belgium	7,643	19,704	6,622	19,079
France	136,571	78,810	101,869	75,773
United States	14,287	3,530	11,926	3,094
Other Countries	....	8,834	....	7,150
Total of Refined	411,361	522,319	319,778	476,893

EXPORTS.—REFINED SUGARS.

	Cwts.	Cwts.	£	£
Denmark	5,759	4,251	3,048	3,231
Belgium	4,646	4,354	2,949	3,314
France	3,880	615	2,267	480
Portugal, Azores, & Madeira	6,495	8,124	3,879	2,379
Italy	10,552	2,652	6,384	2,094
British North America	....	....	....	....
Other Countries	23,483	17,304	15,239	14,103
Total	54,815	32,300	33,766	25,601

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of January, 1888, compared with the corresponding month of the two preceding years, and the average monthly imports for the past year compared with those of 1884, 1885, and 1886, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

Countries from which Sugar has been imported.	"Lumps and Loaves."							"Other Sorts." Including Crushed Loaf, Granulated, Crystallized, &c.							Total.						
	Monthly Average.				Jan.	Jan.	Jan.	Monthly Average.				Jan.	Jan.	Jan.	Monthly Average.				Jan.	Jan.	Jan.
	1884	1885	1886	1887	1886	1887	1888	1884	1885	1886	1887	1886	1887	1888	1884	1885	1886	1887	1886	1887	1888
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
France	2737	1597	1462	1363	1268	1533	2090	1621	463	2688	5099	287	5295	1851	4358	2060	4150	6462	1555	6828	3941
Holland	3580	3848	3508	3780	2367	3079	2922	1948	1472	1428	2483	1246	1326	2992	5528	5320	4936	6263	3613	4405	5914
Germany & Austria	552	808	990	1347	746	1767	1770	2380	3262	6634	10463	6668	6471	12888	2932	4070	7624	11810	7414	8238	14658
Belgium	183	189	344	592	389	245	622	151	120	113	308	128	137	363	334	309	457	900	517	382	985
United States	962	707	854	454	317	167	..	3386	8869	5078	2804	3264	547	177	4348	9576	5932	3258	3581	714	177
Russia	..	..	..	3	..	..	..	..	875	3412	452	10364	..	442	..	875	3412	455	10364	..	442
Other Countries	..	1	..	..	..	..	..	121	24	9	15	..	..	..	121	25	9	15	..	..	..
Total	8014	7150	7158	7539	5087	6791	7404	9607	15085	19362	21624	21957	13776	18713	17621	22235	26520	29163	27044	20567	26117

SUGAR STATISTICS—GREAT BRITAIN.

To February 18th, 1888 and 1887. In Thousands of Tons, to the nearest Thousand.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1888.	1887.	1888.	1887.	1888.	1887.
London	60	76	33	37	39	37
Liverpool ..	113	79	35	34	64	36
Bristol	5	3	7	7	8	7
Clyde	46	43	30	27	32	34
Total ..	224	201	105	105	143	114
	Increase.. 23				Increase.. 29	

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

For the four principal Ports. In Thousands of Tons, to the nearest Thousand. For January, 1888 and 1887.

	STOCKS. February 1st.		DELIVERIES. In January.		IMPORTS. In January.	
	1888.	1887.	1888.	1887.	1888.	1887.
New York	53	80	49	56	60	50
Boston	4	13	7	10	5	7
Philadelphia....	—	1	12	9	12	9
Baltimore	..	..	..	..	..	..
Total......	57	94	68	75	77	66
	Decrease ..37		Decrease.. 7		Increase .. 11	

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, February 16th, 1888.

Fair Refining.	96o/o Centfs.	Granulated.	Stand. A.	Stock in Four Ports.
Feb. 16, 1888.—4¾c.	5 7-16c.	6¾c.	6⅜c.	Jan. 1, 1888— 47,798 tons.
Feb. 17, 1887.—4 9-16c.	5 3-16c.	5 11-16c.	5 5-16c.	Jan. 1, 1887—102,279 tons.
Feb. 18, 1886.—5¼c.	5⅞c.	6⅜c.	6c.	Jan. 1, 1886— 57,328 tons.
Feb. 19, 1885.—4⅞c.	5⅝c.	6⅛c.	5¾c.	Jan. 1, 1885— 89,186 tons.
Feb. 14, 1884.—5⅞c.	6¾c.	7⅛c.	7⅛c.	Jan. 1, 1884— 60,900 tons.
Feb. 15, 1883.—6 15-16c.	7⅝c.	8¾c.	8⅜c.	Jan. 1, 1883— 50,297 tons.
Feb. 16, 1882.—7c.	7¾c.	9¼c.	8¾c.	Jan. 1, 1882— 43,927 tons.
Feb. 17, 1881.—7⅛c.	8 1-16c.	9 1-16-⅛c.	8⅝c.	Jan. 1, 1881— 66,999 tons.
Feb. 12, 1880.—7¼c.	8 1-16c.	9⅜c.	9c.	Jan. 1, 1880— 63,558 tons.
Feb. 13, 1879.—6⅜c.	7 3-16c.	8 7-16-½c.	8⅛c.	Jan. 1, 1879— 50,773 tons.
Feb. 14, 1878.—7¼c.	8c.	9¼c.	8⅞-9c.	Jan. 1, 1878— 48,230 tons.
Feb. 15, 1877.—9⅜c.	10⅜c.	11 5-16c.	11 1-16c.	Jan. 1, 1877— 25,885 tons.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE 31ST JANUARY, FOR THREE YEARS, IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts*.	TOTAL 1888.	TOTAL 1887.	TOTAL 1886.
199	220	32	312	155	22	940	1153	1096

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING 31ST JANUARY, IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts*.	TOTAL 1888.	TOTAL 1887.	TOTAL 1886.
1252	433	45	411	210	337	2688	2583	2579

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROP, OF THE THREE PREVIOUS CAMPAIGNS.

(From Licht's Monthly Circular.)

	1888-89. Tons.	1887-88. Tons.	1886-87. Tons.	1885-86. Tons.
France	500,000	405,000	486,443	298,407
German Empire	1,125,000	910,000	108,842	838,131
Austro-Hungary	515,000	412,500	523,060	377,032
Russia and Poland	450,000	430,000	479,582	537,860
Belgium	135,000	135,000	137,570	88,421
Holland	35,000	36,000	32,263	21,244
Other Countries	65,000	56,050	56,050	55,500
Total	*2,825,000	2,384,550	2,728,810	2,216,595

* See our remarks upon this at page 122.

The figures Mr. Licht now gives for the present and two previous campaigns, differ considerably from those given last month. For 1887-88, the present estimate shows an increase of 84,000 tons, for 1886-87 a decrease of 77,906 tons, and for 1885-86 an increase of 79,244 tons.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

The depression in the sugar market which existed in January, continued through the first half of February; since then there has been a good business done both in raws and refined. But 88°/o, which at one time fell to 14s. 3d., is now 14s. 7½d., or 1s. 7½d. below the highest point in December.

The New York "Sugar Trust" have closed, for a time, some of the large refineries in that city, which has had an adverse effect upon the New York markets for raw sugars. This mischievous "Trust" may close refineries, but it cannot stop consumption. A few weeks hence we shall see an altered state of things; the United States' refiners will be competing with our own refiners for raw sugar, and we shall have prices higher than they have yet been.

The deliveries in the United Kingdom up to February 18 show a slight decrease, as compared with the same period of 1887, of 113 tons, and the imports an increase of 29,001 tons—of which 27,500 tons belong to Liverpool.

The stocks in the United Kingdom on February 18 were 223,491 tons, against 200,722 tons in 1887.

Present quotations for the standard qualities, as under, are:—

	Floating.		Landed.
Porto Rico, fair to good Refining	13/6 to 14/-	against	13/6 to 14/-.
Cuba Centrifugals, 96°/o polarization	15/- to 15/6	,,	15/6 to 16/-.
Cuba Muscovados, fair to good Refining..	13/6 to 14/-	,,	13/6 to 14/-.
Java, No. 15 to 16, good to strong	15/6 to 16/-	,,	16/3 to 16/6.

	Landed.		Last Month.
Madras Cane Jaggery..	10/- to 10/6	against	10/6 to 11/-.
Manila Cebu and Ilo Ilo	10/- to 10/6	,,	10/6 to 11/-.

Paris Loaves, f.o.b.	17/4½ to 17/9	against	18/9
Titlers	19/3	,,	20/3
Tate's Cubes	20/9	,,	21/6
Austrian-German Beetroot, 88°/o f.o.b...	14/7½	,,	15/-

THE

SUGAR CANE.

No. 225. APRIL 2, 1888. Vol. XX.

☞ **The writers alone are responsible for their statements.**

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to Henry Thorp, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see page iii.

Dr. Wiley, the chief Chemist of the United States' Department of Agriculture, is at work upon his report of the Diffusion Experiments at Magnolia, and hopes to have it ready for distribution shortly.

At page 200 will be found a table of statistics for the past six German sugar campaigns, (1881-82—1886-87) taken from official returns, and copied from the *Duetche Zuckerindustrie.* It gives, (1) the number of factories at work in each year, (2) the weight of beets worked up, (3) the amount of raw sugar produced therefrom, (4) the quantity of beets required to make 1 cwt. of sugar, (5) the percentages of sugar obtained, (6 and 7) the imports and exports, on raw sugar basis, (8) exports of molasses and syrups; and the last five columns, show the results to the Treasury. Although in the last year the tax on the beet realized upwards of £7,000,000, of this sum £6,000,000 was returned in drawback, on exportation, leaving only about £1,000,000 as net revenue from sugar. The cost of collecting this, at 4 per cent. on gross receipts, amounts to £280,000. In 1881-82 the net result was more than double that of 1886-87, but the quantity exported was not one half, whilst the amount retained for home consumption was about the same (say 300,000 tons) in both periods.

It would be easy, from a financial point of view, for the German Government to entirely abolish the sugar tax, and make up the amount by a slight increase in the spirit duties.

It appears, says *The American Grocer*, of February 29, that Claus Spreckels confirms the report that he is coming East for the purpose of building a sugar refinery on the Atlantic Seaboard. A Philadelphian, said to be interested in the project, claims that the ground is already selected, with $5,000,000 in hand to commence operations. This goes to prove that sugar Trusts provide in themselves a check against going beyond a reasonable position in carrying out their business.

The sugar trade, in their efforts to get the foreign bounties on sugar abolished, have been strongly opposed by some of the large manufacturers of preserves, who contended that the existence of bounties was a good thing for the people of this country, and for their "industry,"—removing them, meant dearer sugar, which would very seriously affect them. We are glad to be able to give a letter (see page 201) from Messrs. J. Keiller and Son, Dundee, on this subject. Their opinion upon such a matter as this cannot fail to carry with it considerable weight.

The German sugar factory at Alsleben, which was incorrectly reported as about to pay 50% dividend, informs the *Deutsche Zuckerindustrie* that the profits made in 1886-87 were very moderate, and, those for 1887-88 cannot possibly be ascertained as yet, as the greater part of the sugar was still in stock, and the books would not be made up till 1st June.

It is reported from Brünn that the Raigern Sugar Manufacturing Company (the oldest in Austria) is to be dissolved, and ceases its working with the present campaign. The sugar manufactory at Protivin (Bohemia) will not work next campaign. On the other hand, a very large new factory is to be erected at Hatvan, in Hungary.

Last month we inserted a paper (page 146) by Mr. Golding, giving an account of the Diffusion experiments made at Magnolia (Louisiana). We now give (page 181) Mr. J. B. Wilkinson, junr.'s, report, and Gov. Warmoth's report (page 188) of experiments on the same plantation, with the discussions thereon. The result of the experiments, it must be admitted are, in the main, satisfactory, so far as they have gone. The question, will it pay? still, however, remains an open one. Mr. Wilkinson admits that the experiment was not decisive, inasmuch as it did not solve the fuel question; and that diffusion will not be adopted to any great extent, until it is shown, by practical demonstration, how much fuel is required by this process. He further adds that he sees no reason for a planter to throw out a good five roller mill; but a planter with poor machinery, and intending to put up a fresh plant, would be safe in adopting diffusion.

Lord Salisbury has spoken out at last, firmly and squarely, on the question of Protection. The following is an extract from his most recent utterance on the subject. After this we shall not hear much more of what is called "the fair trade" movement.

"I have simply to say with respect to the question of protection that this country has adopted the opposite system after a controversy unexampled in its length, in its earnestness, and in the decision with which the ultimate issue was arrived at. If we are to undertake the re-examination of that question it must not be done incidentally, by insinuation, by allusion, by hints. You must walk firmly up to the fortress that you have to attack and lay siege to it in form. When my noble friend does so I shall be quite prepared to lay before him, and at length, the arguments which utterly prevent me from agreeing with any such proposition. I utterly disbelieve that it is in your power to introduce protection. If it were I think it would be introducing a state of division among the classes of this country which would differ little from civil war. It is a remedy which I am convinced Parliament will never accede to."

The following, relating to the consumption of sugar in the United States, for 1887, and the probable profits of the "Trust" for the present year, we take from *Willett, Hamlen & Co.'s Circular* of March 15th:—"The consumption of sugar in the United States in 1887 was 1,392,909 tons, and the export was 50,889 tons, together 1,443,798 tons, of which 1,356,050 tons passed through the refineries of the United States, and 87,748 tons were consumed without refining.

Of the 1,356,050 tons which were refined, 1,061,944 tons passed through the refineries now controlled by the 'Trust,' and 294,106 tons passed through non-trust refineries, including San Francisco. 1,356,050 tons sugar at 2,240 lbs. each equals 3,037,552,000 lbs. sugar, which at 325 lbs. per barrel of refined equals 9,346,314 barrels, which at 300 working days equals 31,154 barrels per day, of which 7,319,244 barrels per annum, or 24,391 barrels per day, was the amouut produced by the refineries now in the Trust, or say 78 per cent. of the entire production of refined sugar in the United States in 1887, including San Francisco. Centrifugal sugar of 96° test is the standard of raw sugar, and granulated is the standard of refined sugar. In 1884 the average difference in prices of these two standards was ⅞c. per lb., in 1885 it was ⅝c. per lb., in 1886 it was 11-16c. per lb., and in 1887 to October 1st the average difference was ⅝c. per lb. In October, 1887, the average difference was ⅞c. per lb., in November it was ¾c. per lb., and in December ⅞c. per lb. In January, 1888, the average difference was 1 3-16c. per lb., and in February 1¼c. per pound. The cost of refining, including loss of weight, is covered by ⅝c. per lb. between these standards. In 1888, all the non-Trust refineries,—say two in Philadelphia, one in Boston, and two in San Francisco,—will be run to their fullest capacity, and should melt about 370,000 tons sugar (27 per cent. of entire production), which will leave at least one million tons to be melted by the 'Trust' refineries, or say 73 per cent. of entire production.

One million tons, at 2,240 lbs. per ton, is 2,240,000,000 lbs., which, at the present difference of 1¼c. per lb. between the two standards of raw and refined, gives ⅝c. per lb. net profit, or say $14,000,000 net profit to the 'Trust' for the year. The capital of the 'Trust' is said to be about $45,000,000 to $50,000,000, which represents say $15,000,000 to $20,000,000 original value of the separate refineries, and say $30,000,000 to $35,000,000 added as value of the 'Trust' organization."

On the 12th of March a terrible snow storm occurred in parts of the United States, which is spoken of as the most disastrous ever known in New York, and has been attended with extraordinary interruptions to traffic, and loss of life. The price of milk is said to have gone up to 2s. per quart, business for the time was suspended, and many persons perished through losing their way in the storm; whilst a telegram states that, owing to the inability to bury bodies on account of the state of the roads, many funerals had to be postponed, and in some cases hearses containing bodies had to be abandoned on the roads. Another account states that 500 corpses had accumulated unburied, owing to the impossibility of reaching the cemeteries.

"DIFFUSION" IN LOUISIANA.

The following paper, by Mr. J. B. Wilkinson, junr., on Diffusion in Magnolia, was read before the Louisiana Sugar Planters' Association, February, 1888, to which is added (page 188), Gov. Warmoth's report, and a report of the discussion thereon :—

Expositions, new sugar houses and other enterprises do not always begin on the day announced in the programme, and neither did the diffusion experiments, it is fair to say, however, that the officers in charge of the undertaking were not responsible for the delay. The government building, a spacious two-story annex to the sugar house, was completed in July and the cutters and battery and other machinery were in position in September. The work of making the connections and getting things in proper shape was well nigh finished in October, and Dr. Wiley and his efficient staff were on the station hurrying forward the operations. On the 19th of October, however, an unforeseen, and so far as I am aware an unavoidable, tornado unroofed the government building and deposited its burden on the roof of Gov. Warmoth's sugar house doing considerable damage to the latter also. As early as practicable Superintendent Barthelmy obtained from the city the lumber necessary for repairs, but although an extra force of carpenters was put to work, the repairs were not completed until November. On November 18th, as everything was in apparently good order, a preliminary test was made on 16 tons of cane. This test, as is always the case in new machinery, showed various little alterations that were necessary. These were made, and the battery started on the 22nd. After working up 30 tons of cane it was found necessary to overhaul attachments to the cells and to repair valves which had been improperly put together. This was remedied by the 25th, but then it was discovered that both sets of the sugar house boilers were leaking badly. A number of sheets had to come out and it was several days before the boiler-makers were parting guests.

On December 3rd, the first regular experiment took place. Eighty tons 600 pounds of cane was worked up, the machinery, barring stretching belts, working satisfactorily. The cane used was much below the average of the crop in sucrose. This is probably due to the fact that it came from a back stretch.

The following are official figures for this run:—

FIRST DIFFUSION RUN, DECEMBER 3RD.

Per cent. sucrose in cane	11·16
Per cent. glucose in cane	·90
Per cent. sucrose in juice	12·26
Per cent. glucose in juice	·99
Per cent. extraction of juice	94·00
Pounds first sugar to the ton of cane	146·10
Polarization first sugar	97·05
Pounds second sugar to the ton of cane	40·00
Polarization second sugar	91·60
Total sugars to the ton	186·10
Average polarization	96·23
Per cent. of total sucrose extracted obtained in sugars	85·24
Per cent. total sucrose in cane obtained in sugars	80·19
Per cent. sugars on weight of cane	9·30
Theoretical yield of sucrose per cent. cane at 94 per cent. extraction	9·13
Actual yield of sucrose	8·95
Difference	·18

According to previous notice inviting the planters to witness the experiment, the second diffusion run started at 6 o'clock a.m., on Saturday, December 10th. The juice from this experiment was defected by the carbonation process. The machinery worked admirably, except that the chips were not cut fine enough. The following table presents the result of this day's work of 90 tons of cane:-

SECOND RUN.

	Total Solid.	Sucrose.	Glucose.	Coefficient of purity.
Fresh chips	14·98	12·61	·88	84·1
Diffusion juice	9·66	9·96	·69	82·4
Carbonated juice	9·86	8·16	·61	82·7
Exhausted chips		·89		
Semi-syrup	47·70	38·90	2·96	81·5
Polarization of first sugar		96·61		

THIRD RUN.

	Total Solid.	Sucrose.	Glucose.	Coefficient of purity.
Fresh chips	13·88	11·79	·78	84·9
Diffusion juice	9·46	7·85	·63	79·5
Clarified juice	10·05	8·22	·67	
Exhausted chips		·75		
Semi-syrup	44·70	34·60	2·87	74·4
First sugar		96·30		
Molasses from first sugar	72·90	36·70	12·07	50·30

First sugar, per ton	128·1
Second sugar, per ton	43·7
Total	171·8

On Sunday, December 11th, the third experiment was made—110 tons of cane being used. The juice was clarified according to the ordinary process, with sulphur. A yield of 143 pounds of first sugar was obtained to the ton of cane, but as the *masse cuite* of the seconds was not fit for the centrifugals and was afterwards boiled in with Gov. Warmoth's crop, no further account will be taken of this experiment. It may be well, however, to attach some significance to this difficulty with the seconds of the only sulphured strike.

After the third run there was a suspension of active operations for two weeks. Carbonation was found expensive and not otherwise desirable, and the carbonation tanks were converted into clarifiers. The change occupied one week, and the next week the weather was so rainy that it was difficult and for some days impossible to get cane to the mill.

At 6 o'clock a.m., Thursday, December 29th, the battery was again started and, with but little intermission, kept running until 3 p.m. on Saturday. In this, the fourth run, 199·2 tons of cane was worked up, and magnificent results obtained. The juice was clarified in the ordinary way, without, however, the use of sulphur or boneblack, lime being the only deficating agent employed. The following are official figures for this run:—

Average sucrose	14·60
Average glucose	·49
Coefficient of purity	86·05
Exhausted chips, sucrose	·8
Extraction, per cent. sucrose	94·5
Diluted juice, Beaume	5·2
First sugar to ton	165·5
Polarisation first sugar	98·9
Second sugar to ton	45·9
Third sugar to ton (estimated)	15·
Molasses (estimated) gallons	5·5
Total sugar to the ton	226·4

Gov. Warmoth finished grinding on Friday, January 13th, leaving 20 acres of cane, cut and covered in the field, to be worked up by diffusion. The fifth and final run of the battery began at 6 a.m. on Saturday, December 14th, and ended at 7 a.m. on Wednesday, 18th, all the cane, 420 tons having been finished. This was an average of 105 tons a day. As the apparatus worked to perfection and there was no delay this may be taken as a fair estimate of the capacity of the battery at Magnolia, and builders should take note accordingly.

The cane was not quite as rich as that of the fourth run, but polarised well, showing sucrose 14·2, glucose ·60, brix 16·5 and coefficient of purity 85. A very fine extraction was obtained only ·32 of 1 per cent. of sugar being left in the cane. The diffusion juice weighed 16 Beaume. As the mill was idle, Dr. Wiley had in this experiment the use of Gov. Warmoth's clarifiers, yaryan and boneblock filters. An important feature of this last experiment was that the filter presses were not used, the scums from the clarifiers being emptied into the cells. The chips proved to be an excellent material for filtering and there was no injury to the purity of the juice.

It is a matter of great regret that a final statement of the diffusion work at Magnolia can not yet be rendered. As you know it is customary after grinding season to give the wagon sugars ample time to crystalise. Gov. Warmoth has not opened his sugar house since grinding, and until he resumes work in his establishment it will be impossible to dry out the thirds from the fourth diffusion run, and the seconds and thirds from the fifth run. As I saw the six wagons of third sugar from the fourth run, and as the *masse cuite* had granulated well, I have no hesitation in endorsing the estimate of 15 pounds to the ton, which I believe to be under the mark. This would make the yield from the fourth run 226 pounds of sugar to the ton, 211 pounds having been already barrelled and weighed out. Even more is claimed for the fifth run, but it is better to wait for the results than to hazard an estimate. One hundred and eighty-one pounds of grained sugar was weighed out from the latter run. A part of this was granulated seconds. The amount of the wagon seconds and thirds will be learned shortly.

For the purpose of comparison, I submit the following statement from Dr. Spencer's report of the Magnolia crop last year:—

Mill Work for 1886.

Extraction per cent. total juice	85·71
Extraction per cent. cane	78·00
Per cent. sucrose in cane	12·28
Per cent. glucose in cane	·55
Per cent. sucrose in juice	13·50
Per cent. glucose in juice	·61
Pounds first sugar to ton cane	120·47

Pounds second sugar to ton cane	40·53
Total yield of sugar	161·00
Average polarization	96·51
Net sucrose obtained in sugars per cent. cane	7·78
Per cent. of sucrose extracted obtained in sugars	81·21
Per cent. of total sucrose in cane obtained	63·30
Per cent. sugars on weight of cane	8·05

Having been appointed to treat the topic of the evening, it seems to me that my duty is not fulfilled by the recital of bare facts, but that it is incumbent on me to give a free and full expression of my views as so the merits and demerits of the apparatus at Magnolia, and to estimate the value of the results.

The machinery proper of a diffusion apparatus consists of the cutter and battery. The Sangerhausen cutter, at Magnolia, is a horizontal disk placed within an upright cylinder. Twelve grooved knives are set in the disk. The cane is fed through six hoppers placed over the cylinder, and as it falls endways and at an angle of 45 degrees against the rapidly revolving disk the knives shave or plane off the ends of the cane, and the chips are caught by an elevator which conveys them to a distributing hopper at the top of the building, twenty feet above the diffusion battery. Though the chips made by the cutter were not always of the desired fineness, the fault was not with the machine, for when the knives were properly set there was almost a perfect extraction of sugar from the chips. The cutter worked smoothly, gave no trouble whatever, and was fully up to its estimated capacity, 250 tons of cane in twenty-four hours. But there was one drawback which I believe is sufficient to condemn this and all other horizontal cutters, and that is: that there is no apparent way of feeding it economically. It took six hands to supply the battery with a little over 100 tons of cane a day, while four men put on the mill carriers more than 250 tons a day. It is true that the carrier was supplied from cars, but no cutter should be adopted that can not be fed by a carrier on which cars could be dumped if necessary.

The carrier, or forced feed, is not a problem yet unsolved. The vertical cutter at Fort Scott has settled the question, and Dr. Wiley, Mr. Fiske and others think that the Fort Scott cutter can be improved upon by the addition of the shredder.

The elevator is a series of little iron rakes attached on an endless chain, and it worked as perfectly as could be expected of any machine.

From the elevator hopper is suspended a swinging chute, by means of which each cell is filled with chips as required. The convenience of filling the cells in this manner seems to me the only advantage of arranging the battery in circular form.

The diffusion battery consists of twelve cells arranged in a circle, the inside diameter of which is about twenty feet. The cells are cylindrical, seven feet high and three feet six inches in diameter. They are made of boiler iron, except the shoulders and heads which are heavy castings. Each cell has a capacity of sixty-five cubic feet and was estimated to hold a ton of chips. Dr. Wiley had no absolute data on which to base an estimate in ordering the apparatus, and the actual capacity of a cell proved to be only 1750 pounds of chips. The battery, manufactured by the Colwell Company, of New York, is a fine piece of workmanship, and gave satisfaction in all its parts. While it is large enough for the purpose of experimenting, it is not for any plantation that would be likely to adopt diffusion. Though the cost would be greater, it is not more difficult to make a 300 than a 100 ton battery. Larger patterns would be required, that is all. While I see no improvement to suggest in the battery, I think the cells might be differently arranged to advantage. The principle is the same whether the battery is in double line or in circular form. In the latter the cells may possibly be easier filled, but getting rid of the chips, an important question, is made less difficult in a double line. At Magnolia carts were used, but this plan would never do in an age when ingenuity is constantly at work devising labour-saving methods. Under the line battery at Fort Scott there is a car run by reversible cable up a track to the dumping ground, the car being under the control of the man who attends to discharging the cells. Unless some way is found for burning the chips, when a carrier to the furnace would be necessary, the Fort Scott plan would appear to need no improvement. Drs. Wiley and Stubbs are firmly convinced that the chips are far more valuable for fertilizing the land than bagasse, in any form, is for fuel. If this be the case the question of how to get rid of the chips needs no further solution.

While some of the experiments at Magnolia bore no direct relation to diffusion it may not be out of place to notice the treatment of the juice by lignite and carbonatation. The lignite process gave the happiest results in the laboratory, but when tried by Mr. Kleeman on a large scale the filter presses clogged quickly, and the experiment was abandoned. Though it is alleged that the presses did not have a fair trial, the experiment was made under the direction of Mr. Kleeman, and facilities afforded him for making an adequate test.

The carbonatation process received a thorough trial. A large result was obtained in sugar, but the sugar was dark in colour, and carbonatation, destroying the glucose, injured the value of the molasses product. This process would have to give evidence of very conspicuous merit before it would find favour with the planters. The necessary lime kiln and connections are costly, and getting the requisite amount of limestone is awkward and expensive. As it is we have probably seen the last of carbonatation in Louisiana. Dr. Wiley informed me that but for the act of Congress defining the scope of the experiments, he would not have erected the carbonatation plant at Magnolia.

Notwithstanding the criticisms I have ventured freely in regard to the apparatus at Magnolia, I consider that in the results obtained the diffusion experiment was a brilliant success—not a complete success, as my friend Mr. Golding declares, but none the less a triumph for science and for the sugar industry.

The Government has demonstrated practically, and with an apparatus that worked smoothly in all its parts, that the diffusion process will extract almost all the available sugar in the cane. It is one thing to know this in theory, and quite another to see the sugar weighed out. A few years or a few months ago the man who hinted at 200 pounds of sugar to the ton would have been considered visionary. Dr. Wiley has given us 226!

Another important feature of the success at Magnolia is the proof that diffusion juice is as susceptible as mill juice to our ordinary methods of clarification, and that it contains less impurity than that from the mill.

The diffusion experiment was not decisive in that it did not solve the fuel problem. There was no intention or attempt to settle this important question in the experiment lately concluded, and it would not have been practicable to determine accurately the proportion of coal chargeable to the diffusion station. Dr. Wiley estimated the consumption at eleven barrels per 1000 pounds of sugar. The Government was charged with about fifteen barrels to 1,000 pounds, but some of this, of course, was expended in preliminary tests.

It is safe to assert that diffusion will not be adopted to any great extent until somebody shows, by practical demonstration, just how much fuel is required for the manufacture of sugar by this process. It is reasonable to believe, on the other hand, that the fuel question presents no serious difficulty. We all know what a quantity of steam it requires for a mill, and how little for a "double effect." Diffusion does away with the mill and would require less than fifty per cent. increase in the capacity of the double effect.

To give the conclusions I have reached from my observations at Magnolia, I would say that I see no reason for a planter to throw out a good five-roller mill. I believe, however, that the planter who has a poor mill, or intends putting up a new apparatus, would be safe in adopting diffusion. The increase, if any, in the expense of fuel would be fully covered by the larger product from this process.

It is well to remember that the difference between the yield of less than 100 pounds to the ton on some plantations and that of 226 by diffusion at Magnolia cannot be attributed to diffusion alone. Better methods of manufacture otherwise than in extraction are largely accountable for the difference. The only fair way to compare the products of the two methods is where the juice, after extraction, is treated by the same process of manufacture, as was the case at Magnolia. In this instance, in competition with one of the best mills in the State, diffusion came out ahead nearly 30 pounds to the ton of cane.

Gentlemen, I have hardly touched on half the points to which I intended calling your attention, but I fear to tax your patience with a longer essay.

The diffusion experiment at Magnolia was a glorious episode in the history of the Louisiana sugar industry. It has blazoned before your enchanted gaze figures that even now seem to have been called forth by the touch of a magician's wand. It is your interest and your ambition to reach this mark. With full confidence in the future of diffusion I believe that American ingenuity and American enterprize will let this question know no rest until you have reached and surpassed the brilliant record achieved by Dr. Wiley at Magnolia.

Gov. Warmoth then read his report, as follows:—

It would be manifestly improper for me to anticipate the report of Dr. Wiley, the chief chemist of the Department of Agriculture, on the work of diffusion at Magnolia Plantation during the past season. He is now at work preparing it, and hopes to soon have it ready for distribution.

But I can give you some of the already reputed results, and some views of my own based upon them, which may be of service to our industry at this time.

I began by saying that I am satisfied thoroughly that diffusion will work successfully on all conditions of cane. We worked it on green cane, on some fairly ripe and some very ripe and full of sugar, and so far as I could judge it worked as well on the green cane, gave in proportion results as satisfactory, as upon the best cane we had, and as compared with our mill work, showed about the same difference in quantity of sugar, one with the other.

The first cane worked was from second year stubble, and it gave us 146 pounds of first sugar to the ton and 40 pounds of seconds.

The molasses was put into the cisterns with the other, and we cannot give any estimate of the thirds. Our mill gave us 145 pounds first and second from this cane.

The next test was upon some green cane, grown on new land, yielding 28 tons of cane per acre; considerably blown down and sprouted in a small degree. This had much less sugar in it than the first cane. Yet we got 128 pounds of first sugar and 43 pounds second sugar per ton from it.

Our mill gave us 140 pounds of first and second sugar per ton from this cane.

The next run gave us 165·5 pounds of first; 45·9 of second. Total, 211·4 pounds with thuds in the waggons, which we estimate will give us 15 pounds muc., a total of 226·4 pounds.

The next run was on 450 tons of cane, beginning on the 13th of January and ending on the 18th. This cane was rich and fine. It had been killed on the 26th of December, was not wind-rowed, but was in fine condition. From this cane diffusion gave us 181 pounds of first sugar and grained seconds, with enough left in the waggons to bring it up to 223 pounds. From this cane we got 193 pounds of first and second sugar by our mill.

All of this shows about the same difference between diffusion and our mill work, of about 35 pounds of sugar per ton of cane.

I do not mean to be invidious when I say that I think we got a little better extraction by our mill than any of our neighbours. My friend Mr. Dan. Thompson, got more sugar to the ton of cane in 1886 than we did, but this result was obtained not so much by his extraction as by the skilful work in the balance of his house, in which I firmly believe the equal does not exist in Louisiana.

It is safe to say that the average yield per ton of cane in the State is not over 110 pounds. I believe diffusion will bring the average up to within the neighbourhood of 200 pounds. A gain of certainly 75 pounds and perhaps 90 pounds per ton of cane.

My nearest neighbour, Mr. Bradish Johnson, obtained the past season 136 pounds of sugar per ton of cane. We are within three miles of each other; our land is much the same; our cultivation is substantially the same. It is fair to assume his cane was as rich as mine; yet we had about 175 pounds of sugar per ton, a difference of 39 pounds of sugar per ton on our mill work and about 71 pounds difference on the diffusion work. Take his estate for illustration:

His ten thousand tons of cane gave him 139,000 pounds of sugar. Had he worked his crop by diffusion he would certainly have had 70 pounds more sugar to the ton of cane. This would have increased his yield 700,000 pounds of sugar, which at 5½ cents per pound would have given him $38,500 more for his crop than he received.

Take my own crop of 13,300 tons of cane. Had I worked it by diffusion I would have had 35 pounds more of sugar per ton. This would have given me 465,500 pounds more sugar than I obtained—an aggregate of 2,865,000 pounds of sugar from about 600 acres, or 4,750 pounds per acre. The cash increase of my crop would have been, at 5½ cents per pound, $25,592·50, a difference to Mr. Johnson of $3·85 per ton of cane, and to me on my crop of $1·82½ per ton of cane.

I am sorry I cannot give you exact data as to the consumption of fuel. Dr. Wiley will do that very nearly in his report, but I venture the opinion that the man who grinds his cane and hauls away his bagasse; reduces his syrup in open pans, and crystalizes his sugar in the high pressure vacuum pans, will find he can get along in diffusion with less coal than he now consumes. I also venture the opinion that even the man with the ordinary bagasse burner consumes as much fuel as would be necessary to make his sugar with diffusion.

I do not regard the fuel question as at all embarrassing, when we consider the enormously increased yield of sugar we are sure to obtain and the economy we may secure by using modern boilers.

Diffusion has an important advantage over milling besides the increase yield in sugar. The first cost of a good plant cannot be more than the mill; the wear and tear is made lighter; the danger of breakdowns more remote; and, if they occur, are simple and easily repaired. Not so with a mill. Almost every accident to the mill is serious, and the whole crop may be imperiled by it. Again, the work when once started is the same every day. You can obtain the same extraction every day during the whole season. You do not have to feel the bagasse every few minutes, as a doctor does the pulse of his sick patient. You are not troubled by too much or too little feed being put on the carrier. You do not swear when your roller is locked on both ends; no groaning of the mill when it refuses to take the cane; no discovery after a few days' work that there is no oil in the hydraulic; or that there is not weight enough on it, or, which is equally serious, that there is too much weight, and that a shell or a shaft is broken.

With diffusion it is the same thing every day. So many cells filled an hour; so many emptied every hour; the water kept so hot, and that is all there is of it. You can actually get all the sugar out of the cane.

The juice is clarified just as you clarify mill juice, and worked just the same in every way.

It is the simplest, easiest and most efficient way to extract the sugar. Of this there can be no possible doubt.

In my opinion it should be worked on a large scale.

In most sugar houses in the State the cost of introducing diffusion with all its adjuncts puts it beyond the means of individual planters to adopt it. It is necessary if you go into diffusion to go at it right. You can't work it unless you have plenty of good water. A triple or quadruple effect is absolutely essential to its success. You want to give your double flue and cylinder boilers away, and put in the best steaming and most approved boilers that can be bought. Your vacuum pan should be of the best pattern, and your stuff cooked at low temperatures, and you should never attempt it without an excellent laboratory and a skilful chemist, who should carefully test the work as it progresses, and save you from loss.

Neighbourhoods should combine together and erect a factory large enough to take off the crop in the allotted time. This is easier than most people believe. I have heard a gentleman give as an objection to going into a central factory that he might lose his crop while his neighbour saved his, and asked who would get the crop off first. A central factory ought to have the capacity to work all the cane as fast as delivered. I give as an illustration my own neighbourhood.

My mill has a capacity of 275 tons of cane. Woodland has the capacity of 300 tons, and Deer Range about 225 tons per day. My average work the past season, including stops and delays, was about 200 tons, Woodland 145 and Deer Range 120—a total capacity of 800 tons of cane per day. The three houses actually worked less than 500 tons per day.

One diffusion battery could work the whole of this cane, and the expense of two of the sugar houses could be saved, and the output of sugar nearly doubled.

I will say, in conclusion, this: The crop of Louisiana for 1887 is believed to be about 270,000 hogsheads of sugar. I believe if the same cane had been worked by diffusion the crop would have yielded 500,000 hogsheads, and could have been made in central sugar houses at very much less cost. And although the increased yield at Magnolia was only about 35 pounds of sugar per ton, I intend, if I can, to beg or borrow enough money to put in a 400 ton diffusion plant with all the most approved adjuncts, and have no doubt that I can pay for the whole plant in two years by the increased yield of sugar I will have over our best mill work.

In the discussion which followed,

Gen. Brent asked what his green cane polarised? Reply was 11½ per cent. In response to others, Gov. Warmoth said that they used river water to diffuse the chips, part of the time filtered with a Hyatt filter, but as the chips act as a filter, it seemed to do as well without filtering.

Mr. G. G. Zenor asked cost of the cutters? "Reply, about $2,500." Mr. Zenor then said he thought if a planter had a good mill he might use it instead of the cutter and diffuse the bagasse. He asked if this had been tried at Magnolia?

Gov. Warmoth replied they did not because of lack of time. There would be no difficulty in diffusing bagasse. However, to run the mill takes twice as much power as to run the cutter.

Mr. Richard McCall suggested that the shredder might take the place of the cutter.

Gov. Warmoth said Mr. Fiske thought the shredder knives might be so arranged as to slice the cane properly, but it had been found absolutely necessary to have the chips thin or there would be great loss.

Mr. Leon F. Haubtman said he had just returned from Fort Scott, Kansas, and described the cutters used there last season, including a blower to remove the leaves and trash, when a steam ensilage cutter was used to slice the cane. He would put up such a cutter at Col. E. H. Cunningham's Sugar Land plantation in Texas, where a large diffusion battery would be erected.

Mr. William Golding said he observed serious defects in the diffusion battery at Mangolia, especially in the mode of discharging the exhausted chips. He thought they should be removed from the top instead of the bottom; they could be compressed in a cylinder and come out comparatively dry and ready to burn or use as a fertilizer as thought most advantageous. At Mangolia opening to receive sliced cane was too small, and the change of cells could not be uniform. There was no provision for uniform delivery of water. He had designed an improved diffusion battery, and invited members to look at it at the close of the meeting.

Mr. Zenor asked if it required as much labour to diffuse bagasse as the whole cane?

Mr. Golding thought it would, double as much.

The Chair stated that the desire of Dr. Wiley, in introducing the diffusion process, was to get rid of the mill. Planters can not afford to run an expensive diffusion plant and an equally expensive milling plant.

BRITISH AND COLONIAL ANTI-BOUNTY ASSOCIATION.

The following letter has been addressed to the Marquis of Salisbury on the subject of the sugar bounties:—

British and Colonial Anti-Bounty Association,
51, Lime Street, E.C.,
London, 10th March, 1888.

The Most Honourable The Marquis of Salisbury, K.G., &c., &c.

My Lord Marquis,—I am desired by the British and Colonial Anti-Bounty Association, representing the sugar industries of India, Mauritius, New South Wales, Victoria, Queensland, New Zealand, Fiji, Natal, the British West Indies, and British Guiana; also the British sugar refining industry and allied manufacturing and other industries in the United Kingdom, to enclose a copy of resolutions passed at a meeting of the Association held here on the 28th February last, and signed by the General Committee of the same.

In calling your Lordship's attention to these resolutions, I am to express an earnest hope that Her Majesty's Government will be pleased to do all in their power to bring about a cessation of bounties, once for all, by the confirmation of the Protocol which has been already agreed to by the International Conference, subject to such further provisions as may be necessary to secure to the Treaty Powers the due performance of the Convention by all the Powers.

I am further to call your Lordship's particular attention to the references made in the resolutions to the great services rendered by the President, Baron Henry de Worms, and the other British Delegates at the Conference—services which if recognised and supported by Her Majesty's Government cannot fail to secure a solution of this important question.

I have, &c.,
(Signed) N. Lubbock, Chairman.

At a meeting of the British and Colonial Anti-Bounty Association, held at No. 51, Lime Street, London, on the 28th February, 1888, Mr. Nevile Lubbock, Chairman of the Association, in the chair, it was unanimously resolved:—

That this Association, representing the sugar industries of India, Mauritius, New South Wales, Victoria, Queensland, New Zealand, Fiji, Natal, the British West Indies, and British Guiana; also the British sugar refining industry and allied manufacturing and other industries in the United Kingdom, desire to impress upon the Marquis of Salisbury, as the Head of Her Majesty's Government, the great importance of securing, once for all, the abolition of the foreign bounty system at the renewed meeting of the International Conference to be held in April next. The Association regard such a result as absolutely essential to the successful continuance of the sugar industry throughout the British Empire, and they trust that Her Majesty's Government will spare no effort to bring about the abolition of a system so pernicious to British interests and so contrary and repugnant to the principles of Free Trade.

That this Association desire most warmly to recognise the eminent services rendered by the Baron Henry de Worms, not only in the able and successful manner in which he has presided over the International Conference, but also in the personal interviews he has had with foreign statesmen in the capitals of Europe, by which a satisfactory result of the Conference has been further assured; and in expressing their respectful thanks to the President, the Association also desire to include the names of the Earl of Onslow, Mr. Kennedy, and Mr. Walpole, the other British Delegates, who have so effectively assisted in the representation of the Imperial interests concerned in this important question.

List of names attached to above Resolution.

N. Lubbock, Chairman of the British and Colonial Anti-Bounty Association; Managing Director of the Colonial Company, Limited, British Guiana, Trinidad, and Barbados. James Duncan, Chairman, British Sugar Refiners' Committee. Abram Lyle, jun., (Abram Lyle & Sons, Sugar Refiners,) London. Thomas O. Easton, (Macfie & Sons, Sugar Refiners,) Liverpool; Vice-Chairman of the British and Colonial Anti-Bounty Association. J. Ernest Tinne, Chairman of the West India Association of Liverpool; Partner in the firms of Sandbach, Tinne, & Co., Liverpool, and Sandbach, Parker, & Co., British Guiana. Charles J. Crosfield, (Crosfield, Barrow, & Co., Sugar Refiners,) Liverpool. Robert Kerr, (Glebe Sugar Refining Company,) Greenock; Chairman, Scottish Sugar Refiners' Association. T. Neill, Sugar Refiner, Greenock; Secretary, Scottish Sugar Refiners' Association. George Martineau, (David Martineau & Sons, Sugar Refiners,) London; Hon. Sec., British Sugar Refiners' Committee. Henry Tate & Sons, Sugar Refiners, London and Liverpool, per Henry Tate, Vice-Chairman of the British and Colonial Anti-Bounty Association. L. Cowan & Sons, Sugar Refiners, London, per Alderman and Colonel Cowan. J. G. Chapman, Partner in the firm of Fawcett, Preston, & Co., Engineers, Liverpool. Manlove, Alliott, Fryer, & Co., Engineers, Nottingham, per C. Alick Manlove. Sir Daniel Cooper, Bart., Representative of Refineries and Planters of New South Wales, Victoria, Queensland, New Zealand, and Fiji; Vice-Chairman of the British and Colonial Anti-Bounty Association. Charles Parbury, of F. Parbury & Co., Agents for the Colonial Sugar Refining Company, New South Wales, Victoria, Queensland, Fiji, New Zealand. D. Larnach, Director of the Bank of New South Wales. R. J. Jeffray, Chairman of the Melbourne Mackay Queensland Sugar Company, Limited, and Representative of other Queensland Sugar interests. John S. Hill, of Young, Ehlers, & Co. Henry Brandon, Queensland. Daniel de Pass & Co., Natal, S. Africa. Blyth, Greene, Jourdain, & Co., Mauritius and West Indies. Hogg, Curtis, Campbell, & Co., British Guiana, the West India Islands, and Ceylon. The Earl of Harewood, Barbados. Viscount

Combermere, Windward and Leeward Islands. C. Washington Eves, West India Proprietor and Merchant, Jamaica. Thomas Daniel & Co., Limited, West India Proprietors and Merchants, per Audley C. Miles, Director. C. Tennant, Sons, & Co., Proprietors and Merchants, Trinidad. John McConnell, Proprietor and Merchant, British Guiana. Thomson Hankey & Co., West India Proprietors and Merchants. J. Lamont, Trinidad Proprietor. Gillespie Bros. & Co., West India Merchants. D. C. Da Costa, Barbados. Sir Thomas Thornhill, Bart., Barbados. Stewart Gardner, British Guiana. Henry K. Davson, British Guiana. T. C. Garth, Barbados, per F. C. Maitland. J. C. Shaw, Madras, East Indies. Boddington & Co., West India Proprietors and Merchants, Jamaica, Demerara, and Leeward Islands. E. D. & F. Man, Produce Brokers, London. C. M. & C. Woodhouse, Produce Brokers, London. Scott, Simpson, & Wallis, Produce Brokers, London. Paines & Reid, Produce Brokers, London. Sir John Bennet Lawes, Bart. Hermann Voss, Manager, Anglo-Continental (late Ohlendorff's) Guano Works; Manufacturers of Manure for the Colonies. C. & C. J. Coles, Produce Brokers, London. Wilkinson & Gaviller, Barbados. Joseph Marryat & Sons, West India Proprietors and Merchants, per Albert P. Marryat, Trinidad. Wallwyn Poyer B. Shepheard, Barbados Proprietor. James L. Ohlson, Secretary, British and Colonial Anti-Bounty Association.

To which the subjoined reply has been received:—

Foreign Office, March 15th, 1888.

Sir,

I am directed by the Marquis of Salisbury to acknowledge the receipt of the letter dated the 10th instant, forwarding resolutions, signed by yourself and other members of the British and Colonial Anti-Bounty Association, on the subject of sugar bounties.

In reply, I am directed to express Lord Salisbury's satisfaction at the appreciation shown by the gentlemen who have signed the document which accompanies your letter, of the action taken on behalf of the important interests which they represent.

Your letter will be communicated to the British Delegates.

I am, etc.,

(Signed) James Fergusson.

N. Lubbock, Esq.,
British and Colonial Anti-Bounty Association.

EXPORT OF SUGAR FROM CUBA DURING 1887.

Mr. A. de C. Crowe, Her Majesty's Consul-General at Havana, in a report dated the 21st of January last, gives the following particulars of the export of sugar from Cuba during 1887:—

"The total export of sugar and molasses from the Island of Cuba for the year ended 31st December last was 776,468 tons, against 850,407 tons in the previous year, showing a decrease for 1887 of 73,939 tons.

"Of sugar alone, 623,453 tons were exported in 1887, as against 663,343 tons in 1886, being less in 1887 by 39,890 tons.

"The importing countries were: United States, 89·72 per cent. of the sugar and 99·36 per cent. of the molasses; Great Britain, 0·91 per cent. sugar and *nil* molasses; Spain, 7·18 per cent. sugar and 0·35 per cent. molasses; other ports, 2·19 per cent. sugar and 0·29 per cent. molasses.

"Thus, the United States received 91·62 per cent. of the whole sugar produce of the island.

"Since the close of the year remunerative shipments have been made to England, and should present prices be maintained more will doubtless follow."

EXPORTS OF SUGAR AND RUM FROM BRITISH GUIANA.

The Demerara *Argosy* for the 4th February last, contains the following information respecting the exports of sugar and rum from British Guiana in 1886 and 1887:—

"The comparative returns of produce exported in the years 1886 and 1887 respectively, laid before the Court of Policy, disclose some interesting facts in relation to the bearing on our staple industry of the course of trade. In relation to sugar exported, the exact figures are these:—

Countries of Destination.	1887.	1886.	Increase in 1887.
	Hhds.	Hhds.	Hhds.
United Kingdom......	79,419	74,544	4,874
United States	67,392	47,523	19,869
British Provinces	2,760	1,977	782
Other Countries	288	237	51
	149,859	124,281	25,576

"In avoirdupois, these quantities mean that in 1887 we exported 134,874 tons, 8 cwt., 1 qr. of sugar, against 111,855 tons, 7 cwt., 2 qrs. in 1886, showing an excess in 1887 over 1886 of 23,019 tons, 6 cwt. and 3 qrs. It should, however, be explained that these weights are arrived at by calculation, not by actual weighing, the calculation being (if we are correctly informed) based on the assumption that eight barrels or eight bags are equivalent to a hogshead and that every hogshead is equal to 18 cwt. net. There is here a margin for error, though probably not a very wide one, the average weight of packages being pretty well known. It would, however, be more satisfactory to have actual weights, and these ought, one would think, to be easily procurable. Although sugar shipped on estate's account is not usually weighed by a sworn weigher and gauger in Georgetown or New Amsterdam, it is said to be the custom to weigh every package before it leaves the estate, and those weights might be furnished to the Customs Department; but, we fear that, unless it were made compulsory, the duty would sometimes be neglected.

"The chief and most instructive feature of the returns, so far as sugar is concerned, is that three-fourths of the total excess went to the United States. Even in December, when the prices of Demerara Crystals in the London market were at abnormal figures relatively to other sorts, there was an increase of 2090 hogsheads in the shipments to the States against a decrease of 469 hogsheads in those to the United Kingdom. There was also a large proportional increase in the shipments to 'British Provinces' (Nova Scotia and Newfoundland being meant thereby) but the quantity sent thither is not a tithe of what it ought to be, and would be if a reciprocal trade with the Dominion were opened up.

"The relatively small increase (16,550 gallons) in the quantity of rum shipped, concurrently with a large proportional increase in sugar, is indicative of one or two causes, possibly of both: an improvement and more careful supervision of the processes in the manufacture of, or a marked improvement in the quality of the cane juice operated upon. No less than 20,667 of the 24,939 puncheons shipped went to the United Kingdom. The United States took 30 puncheons, against 98 in 1886; the British Provinces 1,618 (against 1,488 in 1886), and other countries 2,613, against 3,528 in 1886, the diminution in the last case being probably due to the raising of the import duty in Martinique.

"Of molasses the quantities shipped was 1,906,600 gallons, against 2,000,100 gallons in 1886. The decrease was no doubt due to the same causes as the relatively small increase in rum—better quality of juice and greater care in the manufacture of sugar. For molasses, 'other countries' are far and away our best customers, having taken no less than 12,978 of the 19,866 casks exported last year. Of this large quantity by far the greater part went as usual to the French West Indies; while 3,029 casks were sent to the British Provinces. 2,948 to the United Kingdom, and 111 to the United States. In 1886, the States took 953 casks, the British Provinces 3,825, and other countries 14,014."

THE CONSUMPTION OF SUGAR IN EUROPE AND THE UNITED STATES, 1885–87.

From the *Wochenschrift.*

	1887.	1886.	1885.
England	1,179,000	1,108,000	1,150,000
France	423,000	425,000	409,000
Germany	445,000	430,000	409,000
Austria-Hungary	250,000	245,000	240,000
Russia	360,000	314,000	328,000
Italy	100,000	97,500	95,000
Spain	50,000	49,000	48,000
Turkey	45,000	42,500	40,000
Belgium	46,000	45,000	44,000
Holland	45,000	44,000	43,000
Sweden & Norway	44,000	42,000	40,000
Switzerland	40,000	40,000	30,000
Denmark	36,000	35,000	34,000
Portugal	16,000	15,500	15,000
Roumania	13,000	12,500	12,000
Greece	9,000	10,000	8,200
Servia	4,000	3,500	3,000
Montenegro	1,000	1,000	1,000
Total	3,106,000	2,959,500	2,949,200
United States	1,397,000	1,389,000	1,245,000
Together	4,503,000	4,348,500	4,194,200

STATISTICS RELATING TO GERMAN BEETROOT SUGAR MANUFACTURE, AND THE RESULTS OBTAINED UNDER THE LATE RÉGIME BY THE GERMAN TREASURY.

From the *Deutsche Zuckerindustrie.* The German weights and measures being converted into English equivalents.

Year.	No. of Factories	Quantity of Beets on which Duty was paid.	Quantity of Raw Sugar obtained therefrom.	Quantity of Beets required for 1 cwt. Raw Sugar	Percentage of Sugar obtained from Beets	Imports	Exports.	Exports of Molasses and Syrup.	Results to the Treasury.				
						Both reduced to Raw Sugar.			Duty on Beets.	Custom's Duty on Imports.	Together.	Drawback on Export.	Net result to the Treasury.
		Tons.	Tons.	Cwts.	Per cent.	Tons.	Tons.	Tons.	£	£	£	£	£
1881–82	343	6,271,948	613,788 _8,500_	10·22 _10·08_	9·79 _9·92_	5,772	314,365	21,118	5,017,658	75,902	5,093,495	3,001,646	2,091,849
1882–83	358	8,747,154	836,423 _12,500_	10·44 _10·30_	9·56 _9·71_	6,652	472,551	14,147	6,997,723	86,529	7,084,252	4,502,043	2,082,209
1883–84	376	8,918,130	940,109 _20,500_	9·49 _9·28_	10·54 _10·77_	5,377	595,814	25,538	7,134,504	70,043	7,204,547	5,446,981	1,757,566
1884–85	408	10,402,688	1,123,030 _23,700_	9·26 _9·07_	10·79 _11·02_	5,305	673,727	65,062	8,322,150	68,795	8,390,845	6,159,515	2,231,430
1885–86	399	7,070,317	808,105 _30,000_	8·75 _8·44_	11·43 _11·85_	5,577	500,322	55,121	5,656,253	71,600	5,727,853	4,583,378	1,144,425
1886–87	401	8,306,671	985,628 _*38,100_	8·43 _8·18_	11·87 _12·32_	4,684	661,128	24,551	7,060,670	61,111	7,121,781	6,102,707	1,019,074

The figures in italics are the quantities of the sugar obtained from the molasses, and the correspondingly reduced quantity of beets per cwt. of sugar, and increased yield of sugar percentage per cwt. of beets. It is expected that the current campaign may here and there possibly show a yield in sugar of 12½% on the weight of beets, exclusive of the gain from molasses.

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* These figures include the sugar obtained from molasses in the refineries also.

THE JAM MAKERS AND THE SUGAR BOUNTIES.

To the Editor of "The Sugar Cane."

Sir,—As a great deal of nonesense has been talked lately about the benefit which jam makers derive from Sugar Bounties, I think the publication of the following letter will be of use.

I am, &c.,

George Martineau,

Hon. Sec. British Sugar Refiners' Committee.

21, Mincing Lane, March 23rd, 1888.

Dundee, 17th March, 1888.

Dear Sir,—Referring to recent conversations anent the abolition of Foreign Sugar Bounties, we consider that such would only be an act of justice to our home refiners, while it would prove a national benefit in promoting the industries of our Colonies. Looking at the matter, however, from a more selfish point, as to how it would affect the trade we are particularly interested in—that of preserve makers and confectioners—we do not see it would do so injuriously; indeed, we do not think it would ultimately produce a material difference in the price of sugar. A certain period of grace would doubtless be granted by foreign Governments before the abolition of bounties took effect. During that interval our home refiners would be reviving and increasing their capabilities of turnout, so as to neutralise the possible decrease in larger supply than at present.

If the abolition of the bounties did raise the price of sugar, we feel sure it would not do so permanently; and, further, we do not believe that any such advance would be detrimental to our trade. Jams and preserves of all kinds are so cheap now that a moderate advance in the price of sugar would not materially affect the consumption.

Yours truly,

James Keiller & Son.

J. Duncan, Esq., Mincing Lane.

PRESENT, AND PROPOSED SUGAR TARIFF FOR THE UNITED STATES.

From *Willett & Hamlin's New York Circular*, March 8th, 1888.

Present Tariff.

From June 1st, 1883, on all sugars not above No. 13 D. S. in colour, all tank bottoms, syrups of cane juice, or of beet juice, Melada, concentrated Melada, concrete and concentrated Molasses:—

Polariscope test ..	75	76	77	78	79	80	81	82
Duty—cts. per lb..	1·40	1·44	1·48	1·52	1·56	1·60	1·64	1·68
Polariscope test ..	83	84	85	86	87	88	89	90
Duty—cts. per lb..	1·72	1·76	1·80	1·84	1·88	1·92	1·96	2·00
Polariscope test ..	91	92	93	94	95	96	97	98
Duty—cts. per lb..	2·04	2·08	2·12	2·16	2·20	2·24	2·28	2·32
Polariscope test ..	99	100						
Duty—cts. per lb..	2·36	2·40						

All sugar above No. 13 D. S. and not above No. 16 D. S., 2·75 cents per lb.

All sugar above No. 16 D. S. and not above No. 20 D. S., 3 cents per lb.

All sugar above No. 20 D. S., 3·50 cents per lb.

Molasses not above 56° by the polariscope, 4 cents per gallon.

Molasses not above 56° by the polariscope, 8 cents per gallon.

Proposed Tariff.

From July 1st, 1888, on all sugars not above No. 16 D. S. in colour, all tank bottoms, syrups of cane juice, or of beet juice, Melada, concentrated Melada, concrete and concentrated Molasses:—

Polariscope test ..	75	76	77	78	79	80	81	82
Duty—cts. per lb..	1·15	1·18	1·21	1·24	1·27	1·30	1·33	1·36
Polariscope test ..	83	84	85	86	87	88	89	90
Duty—cts. per lb..	1·39	1·42	1·45	1·48	1·51	1·54	1·57	1·60
Polariscope test ..	91	92	93	94	95	96	97	98
Duty—cts. per lb..	1·63	1·66	1·69	1·72	1·75	1·78	1·81	1·84
Polariscope test ..	99	100						
Duty—cts. per lb..	1·87	1·90						

All sugar above No. 16 D. S. and not above No. 20 D. S., 2·20 cents per lb.

All sugar above No. 20 D. S., 2·50 cents per lb.

Molasses not above 56° by the polariscope, 4 cents per gallon.

Molasses not above 56° by the polariscope, 6 cents per gallon.

Provided that if an export duty shall hereafter be laid upon sugar or molasses by any country from whence the same may be imported, such sugar or molasses so imported shall be subject to duty as provided by law at the date of the passage of this Act; and provided further, that no drawback of duty shall be allowed or paid on any sugar exported from the United States.

MR. LICHT AND HIS SUGAR STATISTICS.

The following letter on this subject from "Rusticus" appears in the *Sucrerie Indigène* of March 6th.

(*Translation.*)

Mr. Licht beginning again!

Some months ago I endeavoured to show in this Journal the falsity of the predictions of Mr. Licht, of Magdeburg, and I asked on what foundation the fame of this man could be based when his annual estimates of the production of sugar in the whole world, made six or eight months beforehand with imperturbable assurance, are in no way justified and are almost never confirmed by the facts.

After the slips which he has committed of late years, it must be allowed that Mr. Licht possesses a proud audacity to venture to remount his tripod and launch across Europe, with most disconcerting coolness, the figures which I am going to refer to.

We are now at the end of February; the French cultivators, not to speak of others, are asking if they are to sow beets, and in any case how much they shall sow. They are, in fact, looking to the sugar manufacturers, who find themselves in face of a scheme of legislation, the aim of which is to seize the best part of their profits, and of a scheme for an international convention, perpetrated by England, with the manifest connivance of Prussia, which, if it were to be carried into effect, would mean the total ruin of the French sugar manufacture. Mr. Licht knows this better than anyone.

At no epoch, then, has the indecision been greater amongst us, or the perplexity of the sugar industry more striking. It will be still a month, or perhaps six weeks, before a single grain of beet seed will be put into the ground; and Mr. Licht, in his too famous bulletin issued a fortnight ago, announces that in France we shall produce, in the campaign of 1888-89, 500,000,000 kilos. (500,000 tons). Now, if this is not audacity, I ask what name we must give to it?

This audacity is at least justified by the results of preceding predictions? The latter have, then, been realised, so that we may grant credence to the present ones? Let us see.

Last year Mr. Licht, whom I do not hesitate to call unlucky, did not commence his operations until March—that is, a month later—and he estimated that France would produce 550,000,000 kilos. (550,000 tons), and Germany 1,000,000,000 (1,100,000 tons).

In July the cultural deficit was evidently becoming marked, but, as there was no fall in prices, he persisted in the same mistakes.

One would have thought that in September, when the taking up of the beets had commenced, and doubt was no longer possible, Mr. Licht would finally open his eyes, and give in to facts. Nothing of the sort; the man of Magdeburg still repeated: Germany, 1,000,000,000; France, 550,000,000, &c.; Europe, 2,625,441,000 kilos. He was even quite precise in his utterances.

Let us look at the definite result:—

Germany will only produce, according to Mr. Licht himself, 910,000,000, and the production of France will not reach 400 million kilos. (400,000 tons). We have then, for France alone, a deficit of *150 million kilos.* (150,000 tons), or about 40% on the estimates of a year ago.

What does this amount to? Either that Mr. Licht, in prognosticating, six weeks before any beets had been sown, the sugar production of all Europe, wanted to make us believe that he was endowed with a supernatural faculty of divination, or else he wanted to frighten the then holders of sugar, and at the same time depress the quotations for delivery. For, after all, people do not publish such things without a motive, and as a simple intellectual amusement that would be too childish.

In the first supposition the thing would be foolish, sorcery having had its day; in the second case it is a dodge which everyone will know to appreciate at its true value.

The conclusion is, it seems to me, easy to be drawn, so I shall stop for the present, with the intention of returning to the subject if there should be any need.

Rusticus.

NOTES ON BOOKS.

We have received a pamphlet of 86 pages, entitled "Valutazione del Rendimento degli Zuccheri Greggi alla Raffinazione," being a report of two chemists in the central laboratory of the Italian Excise Office, presided over by Senator Cannizzaro. The conclusions arrived at by these gentlemen are of special interest at the present moment, when the question of determining the amount of sugar by means of saccharimetry is about to be considered by the Conference in London. We therefore append a translation, recommending those of our readers who understand Italian to procure the pamphlet by application to the "Tipografia Eredi Botta," at Rome.

(Translation.)

From what we have set forth in the preceding pages, we seem to be authorised to conclude:—

1. That in the present state of our knowledge it is impossible for us to establish a saccharimetric system which will be able to represent with complete accuracy the true yield of a sugar in refining.

2. That in the present uncertainty it will not be opportune to depart too widely from the systems in use amongst those nations who take saccharimetry as the basis of their customs or excise regulations.

3. That the present coefficients of *réfaction* both in France and Holland are too high, and the total allowance for fractions of yield in France is also too high.

4. That, whilst not desiring to vary too much, the saccharimetric systems in force in France and Holland, it is, nevertheless, necessary to take account of all the experiments carried out with regard to the saline coefficient and also of the fact that the coefficient of glucose has a very weak foundation both in science and in practice, and further, that the refiner already has an advantage in the fact that in calculating the yield the polarisation is applied *tel quel* without any correction.

5. That by establishing too high a coefficient of glucose, the State might incur considerable losses.

6. That from these considerations and others already adduced, the saccharimetric system to be adopted, whether for refineries subject to the benefit of the *Drawback*, or in general as basis of the customs regulations, should be the following:

The yield of a raw sugar in refining to be calculated by deducting from the polarisation three times the weight of the sulphurised ash and twice that of the glucose when it is in weight equal to or less than 2 per cent.; all above 2 per cent. to be deducted simply from the polarisation, or else the co-efficient may be applied to it.

From the figure thus obtained, which represents the theoretical yield, is to be deducted 1½ per cent. of that yield by way of allowance for waste; the tenths being disregarded in the figure thus obtained when they are under 0·5, or counted as 0·5 if they are more. The figure thus resulting to serve as basis for establishing the duty.

7. That for the present no account should be taken of the working of the molasses, but a modification of the molasses-generating co-efficients, or the imposition of surtaxes may be looked to, if that industry should become flourishing.

8. That whatever be the system of saccharimetry adopted, the State should not bind itself thereto for any very long period of time.

In connection with the question of saccharimetry, above alluded to, the remarks of an American chemist, published in 1881, may not be out of place. Dr. J. H. Tucker, of New York, says:—

"The method of co-efficients used in France for the commercial value of raw sugars—though doubtless justified for certain beet and high-grade cane sugars—is open to serious objection. The results given by it necessarily vary a great deal, approaching near the truth for some, but falling far short for others, being generally too low. The various saline impurities have individually very unequal injurious effect on cane sugar, some being almost inert, and others very hurtful; besides which the organic impurities have also an injurious action. The soluble portion of the ash, the only one that can have any melassigenic action, is in raw cane-sugars frequently not more than one-half to three-fourths of the total, while with raw beet sugars nearly the whole is soluble, and consists largely of the most melassigenic salts—namely, those of potassium. Further the ash in all raw sugars varies with many circumstances—the methods of manufacture, the soil, manure, &c.—and to lay down a hard and fast rule to measure its injurious action is not only empirical but, from the nature of the case, must be very unreliable. The error of the method in giving results that are too low is much more apparent with raw cane than with raw beet sugars."

"Suppression de la Mélasse par l'osmose perfectionée dans la fabrication et le raffinage des Sucres de Cannes," par Hippolyte Leplay. Compiègne; Imprimerie Henry Lefebvre, 1888.

The above is the title of a pamphlet of 30 pages, the writer of which is well known on the Continent as the inventor of an improved Osmogene apparatus, largely used in France, respecting which detailed information may be obtained from Mr. Engelhardt, 18, Fenchurch Street, London, E.C.

The author is an experimental and analytical chemist of considerable repute, and a short resumé of the contents of his pamphlet may be of use to our readers. He commences by a rather lengthy but interesting disquisition on the salts contained in the molasses of beet and cane sugars, with tables of the proportions existing in a considerable number of samples which he has analysed. Mr. Leplay disputes a statement made by Dr. Stammer at the General Meeting of Sugar Manufacturers, held at Berlin in May last year, to the effect that the proportions of nitrate of potash and chloride of potassium which are found in French molasses do not occur in those of Germany. In support of his view to the contrary he gives the results of the analysis of 25 samples of molasses from different countries, viz., France (10), Germany (4), Belgium (8), Bohemia (1), United States (2), and of 15 samples of molasses of cane sugar. These analyses established the fact that the molasses of beet sugar all contained about the same proportions of these salts, and the average of those in the molasses from cane sugar showed nearly the same amounts. The analyses further shows that all the molasses contained salts of potash and lime with organic acids, but whilst the beet molasses contained a much larger average quantity of potash salts of this description than that found in cane molasses, the latter contained on the average a larger quantity of lime salts of this kind than the beet molasses. The potash salts are the product of vegetation, whilst those of lime are produced in the manufacture of sugar.

The presence of these saline matters plays a preponderating part in the production of molasses, and the restriction of their production ought to be a primary object. Therefore, the reduction to a minimum of the potash salts is to be sought by looking to the soil and the growth of the plant, whilst the restriction of the production of the salts of lime is to be dealt with by the manufacturer.

Now Mr. Leplay claims that his improved system of osmose removes all these melassigenic salts more rapidly and effectually than any other system, and hence prevents the excessive formation of molasses in the later operations, thus resulting in a larger production of crystallisable sugar; and he further maintains that this system is even more advantageous in its results when applied to cane sugar manufacture than in the case of beets. For the manner in which this is argued out, we must refer our readers to the pamphlet, or to Mr. Engelhardt, the London agent of Mr. Leplay.

THE GIBBS' SUGAR DRYING MACHINERY.

We are glad to hear that the application of the Gibbs' Drying Machinery to granulated sugar, is steadily increasing amongst sugar refiners, both at home and abroad.

Several of these machines have now been running for some years in various leading London refineries, and we have not heard of a single adverse report; it is, therefore, fair to infer that the process has been a well-proved success. We are now advised that Messrs. Young, Ehlers & Co., have recently purchased this machinery for an Australian refinery; and that Messrs. Guy, Deacon & Co., have just shipped an 18ft. by 3ft. 6in. machine for Java, and that this same firm have also arranged with Messrs. Gibbs for the purchase of an extra-sized cylinder of 40ft. by 4ft. 6in., to be employed in the drying of megass.

We would call the attention of our colonial readers to this new and important application of the process in which the waste heat after doing its work under the pans and through the boilers, will be utilized to dry the megass for fuel.

Some of the advantages of this process are:—

1. Great saving in first cost as compared with other machines.
2. Simplicity of erection and the facility for increasing the length of the cylinders at a slight additional outlay, so as to increase the capacity as demand may require.
3. Uniformity of out-turn,—every particle of the product receiving its due proportion of hot air in its passage through the cylinder.
4. The process being automatic, very little skilled labour or special attention is required.

SOME IMPORTANT FIRES OF SUGAR HOUSES AND IN THE SUGAR COLONIES.

CHRONOLOGICALLY ARRANGED.

For the following particulars we are largely indebted to Mr. Corneilus Walford's exhaustive "Insurance Cyclopædia." The part which is published occupies five bulky volumes, and comes down to the letter H; the rest is in manuscript ready for the press, but for want of sufficient support has not been proceeded with. The amount of patient labour involved in its compilation must have been immense.

1703. *Port Royal* (Jamaica).—Destructive fire (see 1750).

1738. *London.*—July 1. Messrs. Kibb & Harbin's sugar houses, near Queenshithe; above 20 warehouses and buildings in all, with Mr. Hill's meeting-house.

1738. *Martinique* (West Indies).—About 100 warehouses of sugar, coffee, and other produce burned. Damage, 12,000,000 livres.

1756. *Bridgetown* (Barbados).—February 8. 160 houses destroyed.

1758. *Bridgetown* (Barbados).—February. 120 houses and large amount of produce destroyed.

1766. *Bridgetown* (Barbados).—May 14. 440 houses and many warehouses. The rental of property destroyed, £16,421. Total loss, £300,000.

1767. *Bridgetown* (Barbados).—December 27. Another most disastrous fire. Loss, £100,000.

1768. *Jamaica.*—June 12. Royal Hospital of Greenwich, in Jamaica, destroyed by fire.

1768. *St. Croix* (West Indies).—July. Over 1000 acres of sugar cane, besides houses and other property burned. Damage, £250,000.

1769. *Blackfriars* (London). — July. Mr. Durman's sugar-house burned down.

1769. *St. John's* (Antigua).—August 17. Terrible fire; 300 houses and stores burned, with much merchandize. £400,000.

1771. *St. George* (Grenada).—December 27. The whole town, with the exception of the principal buildings. Loss, £200,000.

1775. *St. George* (Grenada).—November 1. Almost entirely destroyed.

1776. *St. Kitts.*—September 5. Great fire, followed the next day by a hurricane, attended with a deluge of rain. For want of timely assistance the fire spread with unconquerable fury, and the town of Basseterre was reduced to ashes. This terrible hurricane was equally felt at Antigua, Montserrat, and Martinico.

1782. *Kingstown* (Jamaica).—February 3. Upwards of 80 houses and many stores burned. Loss, £500,000.

1784. *Port-au-Prince* (St. Domingo).—June 29. 150 houses in most opulent part of the town, with 30,000 barrels of flour and much other property; occasioned by drunkenness. Loss, £1,200,000.

1791. *London.*—December 13. Wellclose square. Sugar house and other property.

1791. *Port-au-Prince* (St. Domingo). Nearly burnt by revolting negroes.

1794. *Wapping* (London) and *Ratcliffe Highway.*—July 21. There were burnt 630 houses and an East India warehouse containing £40,000 worth of sugar. . . . This was regarded as the largest fire since 1666. Damage, £1,000,000. The Government lent tents for the sufferers to reside in. There was published: *A Sermon Preached on Occasion of the Dreadful Fire at Ratcliffe Highway, July 23, 1794*, 8vo.; with a preface, being a brief historical account of the fire.

1795. *Montigo Bay* (West Indies).—June 12. 110 of the best houses destroyed, and large quantities of produce. £400,000.

1796. *Barbados.*—May. Great fire on this Island; another December this year. Great damage.

1799. *Liverpool.*—May 23. O'Kell's sugar-house.

1799. *Waterford* (Ireland).—December 12. The great sugar-house of Messrs. Perrier's burned.

1799. *Whitechapel* (London).—December 24. Sugar-house of Messrs. Lucas and Martin.

1799. *Stockholme.*—Fire at a sugar-house in suburbs of the city. The difficulties attending the extinguishment of fires in Northern Europe during the winter months are very forcibly illustrated by the incidents of the fire, as described by Mr. Acerbi in his *Travels through Sweden*, &c.

> The accident being announced by the discharge of cannon, all the fire-engines were immediately hurried to the aid of the owners. The severity of that winter was so great that there was not a single spot near where the water was not frozen to the depth of a yard from the surface. It was necessary to break the ice with hatchets

> and hammers, and to draw the water from the well. Immediately on filling the casks, they were obliged to carry them off with all possible speed, less the water should be congealed, as in fact about a third part of it was by the time it was brought to the place where it was wanted. In order to prevent it as much as possible from freezing, they constantly kept stirring it about with a stick: but even this operation had only a partial effect. At last, by the united power of many engines, which launched forth a great mass of water, the fire was got under. The water thrown up to the top of the house by the engines, and flowing back on the mighty power of the frost. After the fire was extinguished, the engines continued for some time to play, and the water they discharged was frozen almost the instant it came in contact with the walls already covered with ice . . . The whole building was incrusted from top to bottom with a thick coat of ice; the doors and windows were closed up, and in order to gain admission, it was necessary with hammers and hatchets to open a passage; they were obliged to cut through the ice, another staircase, for the purpose of ascending to the upper storeys.

1800. *London.*—July 11. Lower Thames Street. Brandy and Sugar warehouses. Loss, £300,000.

1801. *London.*—June 10. Wood Street. Extensive Sugar-house burned.

1805. *St. Thomas* (West Indies).—November 22. Terrible conflagration; some 900 warehouses and stores destroyed. Damage, estimated at £6,000,000. [This island is the storehouse for the produce of many of the other West India Islands.]

1806. *Shadwell* (London).—August 7. Sugar-house in Union Street burned; another in Conduit Street. Great loss.

1808. *Spanish Town* (Trinidad).—March 24. About 1,500 houses, with enormous stores of merchandise, burned; 10,000 people without homes. Estimated loss, £1,500,000.

1815. *Kentish Town* (London).—November 23. Mr. Slack's sugar-mill, Goose Place, burned; also the owner; and his will being also consumed, the case came before the Prerogative Court, Doctors' Commons, 1816. *Slack and others, by their Guardian,* v. *Slack.* The contents of the will being proved, it was upheld, although the document itself was non-existent.

1816. *Port Louis* (Mauritius).—Ravaged by fire.

1817. *Port Louis* (Mauritius).—February 1. The greater part of the town, including all the public buildings, burned. "20,000 people have been reduced to want and beggary."

1819. *Whitechapel* (London).—November. Sugar refinery of Messrs. Severn, King & Co. burned. Damage, £80,000.

1820. *Port-au-Prince* (West Indies).—August 15. Tremendous conflagration. Loss estimated at £600,000. Arose from children playing with fireworks.

1821. *Mile End* (London).—April 3. Messrs. Burnett & Grice's sugar factory (next to Handbury's brewery) burned. Loss, £50,000.

1821. *Mile End* (London).—January 22. Messrs. Smith's sugar refinery. Loss, £200,000.

1825. *St. Thomas* (West Indies).—February 12. About 500 houses, mostly of the smaller sort, burned. Loss, £100,000.

1830. *Liverpool.*—March 21. Great sugar-house, Hartington Street, Loss, £30,000.

1838. *Whitechapel* (London).—December 20. Sugar-house of Messrs. Francis & Co. Loss, £120,000. Insured for £27,000.

1843. *Liverpool.*—March 6. Faucett's foundry. Loss, £41,000.

1843. *Liverpool.*—Brancker's sugar-house destroyed.

.846. *Liverpool.*—September 10. Sugar-house in Bachelor Street burned. Loss, £60,000.

1846. *Greenock.*—September 10. Sugar-house of Provost Farie consumed. Loss, £50,000.

1849. *Glasgow.*—May 6. Great destruction of property: Messrs. Wainwright's sugar refinery and Messrs. Boyd's soap and candle works. Loss, £50,000.

1860. *Limehouse* (London).—Messrs. Godhart's sugar refinery. Loss, £30,000. Out of circumstances associated with this fire arose much agitation regarding "Days of Grace" under fire policies.

1861. *London* (Upper East Smithfield)—Extensive sugar works of Messrs. Harrison & Wilson, near the London docks. The fire originated in the carelessness of a workman throwing a lot of loose paper down the mill-hole of a lift. A portion of the paper became ignited at one of the gas burners and set the premises on fire almost momentarily. Many of the work people—some partly naked and some quite—had the greatest difficulty to escape and several lives were lost. Damages, £30,000.

1861. *Antwerp.*—December 2. Belgian sugar refinery and much other property destroyed, and some lives. Damages, about £120,000.

1862. *Kingston* (Jamacia).—Great destruction of property. Three lives. Damage, £250,000. Only a small portion insured.

1863. *Greenock.*—June 24. J. Walker and Co.'s sugar refinery. £40,000.

1863. *Antigua.*—Nov 1. Destructive fire, occasioned by rum igniting while being drawn from the puncheon.

1864. *Georgetown* (Demerara).—July 5. Another considerable fire, destroying about half the remaining portion of the town. Loss, about £300,000, some half of which was insured, largely in British offices. Steam fire engines were soon afterwards ordered from England.

1865. *Port-au-Prince* (St. Domingo).—Most destructive fire; more than 600 houses burned, and much produce damaged, estimated at £500,000, caused by negligence of lamp trimmer.

1866. *Port-au-Prince* (St. Domingo).—More than 1,000 houses destroyed, many of them belonging to foreign merchants. The loss immense.

1866. *Kingston* (Jamaica).—October 20. Great fire; Treasury, Post Office, Colonial Secretary's office, etc., in all 35 large buildings. Loss, £40,000.

1867. *Basseterre* (St. Kitts, West Indies).—About 1000 houses, or, in fact, the whole town except the Government buildings and some six houses burned. Loss, £200,000.

1873. *Havana* (Cuba).—Disastrous fire, which destroyed the Plaza Vapor and rendered 2500 persons homeless. Loss estimated at £600,000; only about £105,000 insured, all in British companies.

1874. *Amsterdam.*—September 8. Extensive sugar refinery. Loss very considerable.

1875. *Port-au-Prince* (St. Domingo).—Nearly 500 houses, or one-fourth of the town. Fire only stoppped by blowing up buildings. Loss, £400,000, chiefly falling upon British, American, and German merchants.

We have before us a copy of the first policy issued by the Phœnix Fire Office, which is for a sugar risk; it is dated 17th January, 1782. Amount insured, £4,000, and the year's premium £48. The insurers were Messrs. Joseph Bourdorff and John Adam Schwenck, of Mill Bank Street, in the parish of St. John the Evangelist, Westminster. It is signed by three trustees, one of whom was John Coope, father of the late M.P. for Middlesex, who also had a seat at the Board. This place is now filled by the grandson.

The Phœnix Fire Office was started mainly by those interested in the sugar trade. Fire insurance companies at that time (1782) fight-shy of sugar risks.

THE LONDON SUGAR REFINERS AND THE COAL DUES.

The following letter has been addressed to the First Lord of the Treasury:—

The Right Hon. W. H. Smith, M.P., First Lord of the Treasury.

Sir,

I am desired by the London Sugar Refiners' Association to direct your attention to my letters of the 20th November, 1883, and the 21st January, 1887, addressed to the Chancellor of the Exchecquor, in reference to the London Coal Dues.

It appears from a statement in to-day's *Morning Post* that Her Majesty's Government, in spite of their distinct and repeated condemnation of the Coal Dues, as unsound in principle and unjust in their incidence, are considering the question of their continuance.

We have already pointed out that the Sugar Refiners pay a tax of from one to two thousand a year for each firm in Coal Dues, which in some cases is equivalent to a rate of 16s. in the pound. It might be thought that this fact alone would be sufficient to procure the immediate abolition of so unequal a system of taxation, more especially as it operates as a strong discouragement to the growth of manufacturing industries in London, thereby tending to increase the already serious burden of unemployed labour in the Metropolis.

It is now pretended, because a majority of the Metropolitan Members are in favour of a renewal of this tax, that therefore the Metropolis is of the same opinion. This is very far from being the case, as is conclusively shown by the fact that wherever *bona fide* Public Meetings have been held, the tax has been condemned, sometimes unanimously, but always by a large majority. This has been the case even in the constituency of the Hon. Member who the other night stated that "the majority of the representatives of the people of the Metropolis were in favour of the Coal Dues." We must therefore protest against the assumption that the Metropolitan Members represent the opinion of their constituents on this question.

The proposal to return a portion of the proceeds of the tax to the outlying districts is a bold bid for their support but does not add to the soundness of the measure. If too much be returned, then we manufacturers are helping to reduce rates in other districts. If too little, then manufacturers in such districts are paying the whole rate of the district.

To sum up our case against the Tax. It is against the first principles of taxation; it seriously handicaps manufacturers and thereby aggravates the evil of unemployed labour; it has been condemned at all public meetings where the question has been discussed; the opinion of the Metropolitan members does not therefore represent the views of the Metropolis on this point; and, finally, the proposal to return the dues in the outlying districts aggravates the injustice and unsoundness of the tax.

For all these reasons, in addition to those stated in our former letters, we most earnestly pray that Her Majesty's Government will steadfastly refuse to countenance any scheme for renewing the London Coal Tax.

I am, Sir,
Your obedient servant,
GEORGE MARTINEAU,
Hon. Sec. London Sugar Refiners' Association.

21, Mincing Lane, March 21st, 1888.

10, Downing Street, Whitehall,
22nd March, 1888.

Sir,

I am desired by Mr. W. H. Smith to acknowledge the receipt of your letter of the 21st inst., relative to the London Coal Dues, and I am to say it shall receive the due consideration of Her Majesty's Government.

I remain, Sir,
Yours faithfully,
C. V. MANDER.

GEORGE MARTINEAU, Esq.

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., F.C.S., M.I.M.E., Patent Agent, 6, Lord Street, Liverpool; 6, Bank Street, Manchester; and 323, High Holborn, London.

ENGLISH.

APPLICATIONS.

2511. A. CHAPMAN, of the firm of Fawcett, Preston & Co., London. *Improvements in apparatus for evaporating saccharine or other solutions or liquids.* 20th February, 1888.

2963. J. Clark and T. S. McInnes, Glasgow. *New or improved apparatus for sighting the interiors of steam-boilers, sugar-pans, and other closed vessels.* 28th February, 1888.

3990. R. Everitt, of the firm of John Birch & Co., London. (Communicated by Messrs. Taylor and Lawson, Bataira.) *Improvements in apparatus for drying sugar.* 14th March, 1888.

ABRIDGMENTS.

4889. T. Tomlinson, South Brisbane, Queensland. *Apparatus for trashing and cutting sugar cane and such like crops.* 1st April, 1887. This is a cane harvesting machine; shoes like ploughs pass between the rows of cane, raising and supporting such canes as are lying over, by the aid of travelling chains carrying folding guides. The canes are trashed by passing between elastic reciprocating blades worked by eccentrics on the shafts which drive the travelling chains. The tops are cut by a set of cutters in a frame adjustable in height by a hand rope. The bottoms are cut by a knife on a swing frame, worked by a cam and wiper. The cut canes fall on the ground behind the machine or on to the table of an elevator, which intermittently elevates them into carts.

4397. H. W. Walker and T. L. Patterson, Greenock. *Improvements in apparatus for moulding and refining sugar.* 24th March, 1887. A mould fitting the interior of an unperforated centrifugal is filled with thin annualar horizontal plates, arranged a short distance apart, which when built up leave a conical central vacancy ; in this the *masse cuite* is run till the divisions between the plates are filled. The mould is then fitted with a centre cone and taken out to cool. It is then placed in a centrifugal with porous cage, the central cone removed and the green syrup run out, after which it is further refined, by treating with pure syrup and steam or hot air in the usual manner, it is then taken from the centrifugal, the plates removed and the flat slabs of sugar broken up into cubes, &c.

17793. P. Thompson & Co., Liverpool, London, and Manchester. (Communicated by J. H. Man, of Denver, Colorado, U.S.A.) *Improvements in apparatus for extracting the juice from cane, sorghum, and other like substances.* 27th December, 1887. In place of a pair of rolls, two grooved, roughened, or toothed shafts are used, say six inches apart, and two large annular drums with similarly grooved, roughened, or toothed interior surfaces, say three inches thick, are passed over these shafts, the shafts being thus very eccentrically placed in the drums, and holding the drums against each other, the grooves or teeth of the shafts working in the grooves or teeth of the drums, the shafts being pressed together and revolved, the drums revolve too, and act as a pair of rolls for cane crushing.

13955. S. Fiske, of New York, U.S.A. *Improvements in apparatus or devices for the treatment of sugar cane.* Dated 14th October, 1887. The bearings of the upper roll slide in oblique guides, open at the top, and are controlled by adjusting screws and relieving springs. The two pair of slides are connected by a back plate, having a door for inspection of the rolls.

17289. T. Tomlinson, of Brisbane, Australia. *Improvements in apparatus for trashing and cutting sugar cane and such like crops.* Dated 15th December, 1887. The apparatus is drawn along the ground by horses or other power travelling on wheels. Series of "path finders" or surface ploughs make way for the machine among the canes, and raise those that are bent over sidewise till they stand on a series of chain racks; these rise as the machine proceeds. The effect is as if the stems had grown each in a large mesh of network, which, when lifted up, raises such stems as are bent over. The stems thus raised and supported are now cut at the bottom. The stems are now released at the top and fall backward on to travelling chains, by which they are carried to the topping knives; the canes are guided past these with their butts at the requisite, uniform distance from the knives. The topped canes are now forced endwise, top first, through indiarubber or other elastic rubbers on a pair of bands, and fall in heaps by the side of the machine, freed from their trash or leaves. They can then be collected and carted to the mills.

1931. M. A. Perret, Paris. *Improvements in apparatus for extracting the saccharine or other soluble matter from sugar cane and other substances.* 7th February, 1887. This specification which is rather voluminous and has 10 sheets of drawings, describes an apparatus for treating sugar cane, in which the cane, cut up into small pieces is kneaded, macerated, split, or disintegrated, and pressed by a continuous action, and out of contact with the atmosphere, the cane being delivered at one end of the machine as megasse exhausted of saccharine matter, while at the other end, the extracted saccharine juice is made to flow off.

7259. F. Harm, Kurtwitz, Prauss, Germany. *Improved process for converting the syrups from sugar manufacture into mono-saccharates.*

18th May, 1887. The claim is as follows:—In the manufacture of raw and refined sugar, the process consisting essentially in conducting the syrups from the first product in a diluted state, and with the addition of sugar and sweetening waters and, if required, further dilution with water, to a saturating station, and in the admixture of a sufficient quantity of lime for the formation of mono-saccharate in the separation by means of carbonic acid and purification.

165. C. D. Abel, London. *Method of extracting foreign substances, in particular raffinose from sugar solutions by means of lead, either in the form of oxide or as electrode.* 5th January, 1887. The inventor extracts raffinose from sugar by stirring the juices with finely ground oxide of lead or electrolysing the solution with a cathode of lead and an anode of any suitable metal, by this means a compound of lead and raffinose is precipitated.

2138. H. L. Sulman and E. E. Berry, London. *Improvements in the treatment of grain for the manufacture of starch or glucose.* 11th February, 1887. The grain is macerated at about 60 degrees centigrade with a large excess of milk of lime.

5660. J. Thomson, Edinburgh, and J. Black, Kirkcaldy, N. B. *Improvements in or connected with sugar cane mills.* 19th April, 1887. The preparatory or first rolls of sugar cane mills are constructed with surfaces having flutings or longitudinal depressions combined with transverse or inclined grooves.

AMERICAN.

36959. F. O. Matthiesson, Irvington, N.Y., U.S.A. *Improvements in continuous working bone black filters.* 27th October, 1885. Over the rotating disc provided with radial slits (see the abridgment of previous patent, No. 36839), there is a diametrical band or plate which prevents the disc from causing the column of charcoal to revolve with it. Above the layer of charcoal there is a so-called compressor for the purpose of pressing down on the charcoal. The same consists of four radial vertical and flat stays in a pipe provided at its lower end with wings similar to the blades of a steamship screw, and of an upper reservoir for the reception of fresh bone black, which falls on the wings that are perforated to allow the passage of the juices.

37001. Louis Walkoff, Kalinofka, Southern Russia. *Bag filters for sugar juices.* 9th October, 1885. A vessel having the shape of a box and provided with a lower feeding canal contains a large number of filtering bags, fastened to the top of the box by means of a wooden plug, and secured at their lower part on short projections by means of string. The juice penetrates into the bag through these projections, and is filtered from the inside to outside. The filtered juice flows through an outside gutter, whilst a part of the mud settles in the bag. When the flow of the liquor ceases, the bags collapse, thereby causing the mud to drop down so that the bags are again in good order for another operation.

37050. Patent of addition on Patent 31244. Hippolyte Leplay, Paris. *Improvements in the osmose apparatus protected by the latter patent.* 2nd March, 1885. In the triple effect osmose and evaporating apparatus, described in the main patent, the inconvenience is felt that the ondensation of the vapour under the parchment paper causes the formation of a saline osmose liquid, which drops in the lower exosmose liquid, and deteriorates the quality of the latter, owing to the unequal composition. In order to collect separately the liquid which drops down, a horizontal diaphragm (an intermediate table) is fixed under the parchment paper. Besides, the parchment paper is covered with a second metallic net to increase its solidity. The second upper evaporating pan is kept in equilibrum by counterweights, so that it can be easily raised above the one which is below. This modification contains many evaporating pans which all communicate with the external air by means of canals at the side. The parchment paper that has been used in the osmose and evaporating apparatus is regenerated in the following manner: It is first of all treated in the apparatus itself with cold solution of lime, from which a part of the lime is precipitated by heating, the lime solution is then let out and replaced by one of soda without causing the heating of the apparatus to cease, carbonate of lime is then precipitated in the pores of the paper.

37186. F. O. Matthiessen, Irvington, N.Y., U.S.A. *A device for the removal of spent charcoal from continuous charcoal filters.* 9th February, 1886. The continuous charcoal filter belong to the kind in which the sugar juice filters in the upward direction, whilst the lower layer of charcoal, which has become unfit for filtration, is removed at short intervals by a scraping contrivance which consists of horizontal, trough-shaped, hollow grate bars (slitted pipe). The ends of these bars are produced with journals and a toothed wheel. These end wheels are caused to revolve by means of a rack common to all the bars in such a manner that at each turn the contents of the hollow inside of the bars are emptied.

ABRIDGEMENTS.

376490. H. F. Thurston, of Bartlett, New Hampshire, U.S.A. *Evaporating pan.* January 17th, 1888. This invention consists in an evaporating pan, having the dependent fire box below formed with hollow walls, the space between them communicating with the pan.

378232. P. Casamajor, Brooklyn, New York, U.S.A. *Process of treating saccharine solutions.* February 21st, 1888. The saccharine solution is treated with milk of lime to form a saccharate of lime, then with carbonic acid till the lime is thrown down and again dissolved, the excess of carbonic acid is driven off by heat, and the lime again precipitated, carrying down with it the impurities.

378230. P. Casamajor, Brooklyn, New York, U.S.A. *Process of treating liquids in vacuum pans.* February 21st, 1888. The vacuum pan is heated by the injection of steam at higher pressure than the pan itself. The steam combines with water to form an increased quantity of steam at the lower pressure.

378598. P. Labertie, Paris, France. *Evaporating apparatus.* February 28th, 1888. In this apparatus hot air is drawn through a pipe into the pan below a perforated false bottom, by means of the suction of the vacuum pump the effluent air and steam heat the store liquor.

378843. S. M. Lillie, Philadelphia, Pennsylvania, U.S.A. *Vacuum apparatus for evaporating liquids.* February 28th, 1888. This invention consists in combining a series of evaporating pans, each having a construction (substantially as shown in United States Patent, No. 341,669, dated May 11th, 1886, and described in this journal shortly after) to form a multiple effect evaporating apparatus, and it consists further in a series of surface heaters arranged in connection with the pans of the multiple effect, and operating to use a portion of the vapours from the several pans for heating either a single liquid passed in succession through the several heaters in the direction from the coolest to the hottest, or for heating different liquids in the several heaters respectively.

GERMAN.

ABRIDGMENT.

40003. (Patent of addition to Patent No. 39279, of May 2nd, 1886.) Emil Heffter, Alt-Jauer, near Jauer, Silesia. *Improvements on the* *process described in Patent No. 39279 for the clarification of sugar juices by means of tannic acid (tannin).* May 12th, 1887. In the process described in the main patent, one portion of the tannic acid added is used for the purpose of precipitating the nitrogenous impurities of the sugar juices, whilst the other portion is solely used to reduce the alkalinity. The latter portion is therefore replaced appropriately by cheaper lime precipitants, such as for instance carbonic acid, sulphurous acid, phosphoric acid, or oxalic acid, and a great saving of tannic acid is thus effected.

37189. Noebel & Luttich, Inowrazlaw. *An apparatus for the automatic closing of the steam inlet in juice pumps and showing at the same time that the latter are emptied.* 26th February, 1886. In the steam piping of the juice pump, a double seat valve is inserted, which valve is provided on the upper side with a rod connected with a spring tending to lift the valve from its lower seat; whilst on the lower side the said valve is connected by chains to a floater guided vertically by two rods. If the juice pump gets empty, the floater sinks into the bottom and pulls the chain and the valve to which it is attached, the said chain having been made of suitable length so that when the floater is at the bottom the valve prevents the steam from entering the juice pump, and allows it to escape from the admission pipe. The exhaust pipe has the form of a whistle, so as to give an alarm signal when the steam escapes.

37199. Franz Nowak, Roswadze, Upper Silesia. *Improvement in vertical evaporating apparatus, with a view to using the same for the purpose of boiling refined sugar masses.* 19th July, 1885. In order to boil in the ordinary vertical apparatus by means of exhaust steam the refined filling masses, which were hitherto boiled only in vacuum apparatus by means of steam at a pressure of 45 to 60 lbs. circulating in a worm pipe, the solution valve of the former apparatus, or at least its prolonged outlet, is arranged in the outlet support, so that the boiling cleare sucked in lifts up the concentrated mass, and the latter cannot get fast inside the pipes or the outlet support. A double bottom keeps the mass constantly in solution on the bottom during the boiling process.

37326. Alfred Seyberlich, Riga, and Alexander Trampedach, Mitau, Kurland. *A process for the preparation of crystallised anhydrous grape sugar by means of nitric acid.* 7th March, 1885. Whilst up to the present day a small quantity of nitric acid was added for the purpose of accelerating the transformation of starch into sugar by means of sulphuric acid, this new method employs exclusively nitric acid in the proportion of ½ per cent. of the quantity of air dried starch. The solution of sugar neutralised with chalk is mixed with carbonate of soda or potash in excess, after which the sugar crystallises not in small needles mixed together and difficult to treat in the centrifugal, but in separate well-formed crystals, which are easily treated in the centrifugal.

37350. H. Kröger, Elbing. *Improvements in automatic stopping apparatus between juice pumps and filter-presses.* 15th December, 1885. The central elevating pipe of the juice pump is provided at its upper end with a vessel containing a floater, which acts on a shaft which can turn through a stuffing box, this shaft acts in its turn through the medium of a roller lever on the overflow valve, and raises a weight which is so arranged that the overflow valve opens of itself. But when the juice pump and floater vessel are empty, the floater sinks and closes the overflow valve so that the steam in the juice pumps cannot get into the juice pipe of the filter press. When the juice pump has been filled up again, the overflow valve is closed by lifting the weighted lever through the medium of a chain.

37359. Fredrich Hahn, Sudenburg-Magdeburg. *Improvements in machinery for the breaking up of Sugar Sticks for sweets* (*Rock*). 7th March, 1886. Two rows of vertical pipes placed near each other receive the sugar sticks, which they present to the edge of an advancing knife, to which an eccentric communicates a to and fro motion, said knife being guided in grooves. In order to be able to give to the sweets any determined length or thickness, the rollers covered with rubber or leather on which the sugar sticks rest before receiving the blow of the cutting blade, can be displaced vertically in their guides. In the case of thin sugar sticks the rollers can also be displaced sideways, to prevent the sticks from sliding past them without being reached by the cutting edge.

37396. Sixth patent of addition to patent No. 3608 of Alexander Herbst, Sokolniki, Moscow. *Improvement in apparatus for the preparation of rectangular or square sugar sticks* (known also as plates, etc.) 30th May, 1878. The machine protected by claim 2 of the principal patent and which serves to empty the moulds, if completed by a sledge sliding on rails. In the inner parts of the sugar moulds protected by claim 2a of the principal patent, the full angle pieces are replaced by others having half the height and two common side plates which are engaged on both sides of the mould frame for the purpose of removing more easily the sugar from the inside of the moulds.

37537. Auguste Nugues, Paris; Armand Vivien, in St. Quentin; and E. Rottger, Brunswick. *A process for the separation of sugar from alcoholic sugar solutions by means of dehydrating bodies.* 15th November, 1885. After the greater part of the sugar has been precipitated by alcohol, the clear solution is displaced by calcine carbonate of potash, whereby a precipitate is formed which consists of aqueous carbonate of potash and sugar. The sugar is removed from this precipitate by means of boiling alcohol, at 60 degrees Tralles at least. In this process only traces of potash should pass in the solution. Instead of carbonate of potash, other bodies retaining water are proposed, such as, for instance, chloride of calcium. Furthermore, it is also possible to cause these to work without placing them in direct contact, by having recourse to the Osmose process. The chambers of an Osmose apparatus are filled alternately with alcoholic sugar solution and carbonate of calcium. The wide chambers of this Osmose apparatus have osmose partition walls, consisting of unglazed burnt clay or of parchment paper, porous plastic coal, animal skins, cotton, wool, hemp, or cloth. In this operation the sugar is said to separate from the alcohol in consequence of the removal of the water, whilst the carbonate of calcium dissolves without spoiling the sugar.

37608. E. E. Quimby, Orange, New Jersey, U.S.A. *A contrivance consisting of revolving grate bars, for the removal of charcoal from continuous filters.* The partially revolving grate bars, which are set in motion by means of a common slide rod, possess, opposite to the crank, an additional piece of segmental section. This section was, in opposition to similar well-known oscillating grates, chosen for the purpose of preventing the grate bars from communicating motion to the mass of charcoal which is loading them and rendering them in consequence easy to move.

38258. Paul Reuss, Artern. *Pneumatic root proof stick for testing beetroot.* March 19th, 1886. For the purpose of taking samples of beetroot in the form of plugs, an air pipe is adapted to the proof pipe of the apparatus. In the air pipe is a piston pressed down by a spiral spring, the piston rod extending above the surface of the piston. By raising a lever connected with this rod, the latter is secured in a higher position by means of a bolt, in consequence of which the spring is compressed when the lever is pressed down. As soon as the sampling pipe has penetrated through the beetroot, the bolt is drawn back by means of a disconnecting rod attached to the above lever, the piston becoming free is drawn downwards, compresses the air on the plug of beetroot, and forces it out of the sample vessel.

38261. M. Gebauer, Halberstadt. *A machine for cutting sample pieces from beet roots and similar objects.* June 10th, 1886. This machine consists of two knives crossing each other which are by means of a rack, and of a toothed wheel provided with a crank set in motion on a sliding bed. It also consists of two clamps movable on trunnions, which can be brought opposite or drawn back from each other by means of a right and left hand screw for the purpose of holding the beetroot between them. By means of this machine, the sixth part of each beetroot is obtained, this part having the same composition as all the zones of the beetroot, which, it is well known, are each of a different composition.

38397. J. Fischer, Vienna. *Improvement in separating and filtering apparatus.* March 21st, 1886. The filtering apparatus consists of a horizontal cylinder, the bottom part of which has an annular shape, this cylinder contains circular filtering chambers, the discharge pipes of which are applied on bottom conical projections by means of union nuts. Crossed trush discs rotate between the filtering chambers provided with separating sieves for the purpose of effecting a continous cleaning. These discs are set in motion by means of a suitable tooth gearing. The deposits which are removed from the filtering surfaces collect at the bottom of the apparatus, and are transported by means of an archimedian screw into a vessel from which they are evacuated by appropriate means.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

CONFERENCE OF THE TRADES UNIONS OF THE UNITED KINGDOM ON FOREIGN STATE BOUNTIES.

On the 22nd of March, a very important Conference of Delegates from the Organised Trades of the United Kingdom, in favour of Free Trade and condemnatory of Foreign State Bounties, was held at the Westminster Palace Hotel, Mr. Thomas Burt, M.P., in the chair.

The following is a list of Delegates present and Societies represented in pursuance of special resolutions passed in that behalf by the respective Associations:—

Abrey, T., Perseverance Society of Carpenters and Joiners, London.
Allan, J. C., Silver Spoon and Fork Makers' Society, London.
Allen, T. F., Boiler Makers and Iron Ship Builders, London.
Arrandale, M., Machine Workers' Association, Manchester.
Belbin, W., Sadd, A., Amalgamated House Decorators and Painters, London.
Bell, J., Cokemen's Association, Durham.
Bevan, W., Trades' Council, Swansea.
Binnington, A., Hatters' Society, London.
Birtwistle, T., (J.P.) Holmes, D., North East Lancashire Amalgamated Weavers' Association, Accrington.
Bloor, C., (Councillor), Clay Potters' Society, Burslem.
Bloor, E., (Councillor), Tool Makers', &c., Society, Birmingham.
Bowes, W., Central Painters and Decorators' Society, London.
Cameron, W., Amalgamated Boot and Shoe Makers' Society, London.
Clegg, D., Trades' Council, Bolton.
Davis, T. J., Drummond, C. J., Freak, C., Powell, T. E., Shipton, G., Trades' Council, London.
Coulson, E., Bricklayers' Society, London.
Cowburn, J., Amalg. Society of Lithographic Printers, Manchester.
Cowell, J., Boot Makers' Society (No. 2 Section), London.
Deans, J., Tin Plate Workers' Society, London.
Drohan, L., Trades' Council, Liverpool.
Dyson, G., King, H. R., Consolidated Society of Bookbinders, London.
Edwards, E., Miners' Association, North Staffordshire, Burslem.
Fielding, J., (J.P.), Cotton Spinners' Provincial Association, Bolton.
Fisher, H., Trades' Council, Preston.
Fox, J., Provident Society, Bristol and South Wales.
Gardner, J., Trades' Council, Cardiff.
Granger, A. (Councillor), Haddleton, A. W., Trades' Council, Birmingham.
Griffiths, J., Humphreys, D., Silver Plate Polishers' Society, London.
Harford, E., Amalgamated Society of Railway Servants, London.
Harper, R., Tanter, J., Progressive Cabinet Makers' Society, London.
Harris, J., Trades Council, Newcastle, Gateshead, and District.

Haslam, J., Derbyshire Miners' Association, Clay Cross.
Heginbotham, W., Trades' Council, Hyde and District.
Hey, W. H., Ironfounders' Society, London.
Horobin, T., Trades' Council, Leicester.
Humphreyson, C., West End Cabinet Makers' Society, London.
Hunter, A. J., Trades' Council, Glasgow.
Iles, R., Brassworkers' Society, London.
Inglis, J., Associated Blacksmiths, Glasgow.
Inskip, W., National Union of Boot Rivetters, Leicester.
Jack, J. M., Ironmoulders of Scotland, Glasgow.
Jarvis, J., Silver Plate Workers' Society, London.
Johnston, W., Trades' Council, Aberdeen.
Judge, J., National Union of Boot Rivetters, Leeds.
Keir, G., Amalgamated Tailors' Society, Manchester.
Kelley, G. D., Trades' Council, Manchester and Salford.
Kenney, W., Thompson, J., } Stone Masons' Society, London.
Kinggate, C., Coach Makers' Society, London.
Knight, R., Boiler Makers and Iron Ship Builders, Newcastle.
Lambton, W. H., Colliery Enginemen's Association, Durham.
Lemon, J., West End Ladies' Shoe Makers' Society, London.
Maddison, F. (Councillor), Trades' and Labour Council, Hull.
Mallinson, J. (J.P.), Razor Grinders' Union, Sheffield.
March, W., Amalgamated Farriers' Society, London.
Marston, W., Trades' Council, Leeds.
Matkin, W., General Union Carpenters and Joiners, Liverpool.
Maudsley, J., Amalgamated Operative Cotton Spinners, Manchester.
Metcalf, J., Trades' Council, Ipswich.
Osborne, J., Steam Rotary Framework Knitters, Nottingham.
Patterson, W. H., Wilson, J., } Miners' Association, Durham.
Poole, J.. City Ladies Shoemakers' Society, London.
Pye, J., Gold Beaters' Society, London.
Riley, W., Silver Spoon and Fork Finishers' Society, London.
Ritchie, R. D. B., Trades' Council, Dundee and District.
Rose, G., Glass Blowers' Society, London.
Shaftoe, S., Trades' Council, Bradford.
Silk, G., Trades' Council, Oldham.
Slatter, H. (J P.), Typographical Association, Manchester.
Smyth, Metropolitan Plasterers' Association, London.
Steadman, W. C., Barge Builders' Trades' Union, London.
Stevens. J. V , Tin Plate Workers' Society, Birmingham.
Swancott, F., Window Glass Cutters' Society, London.
Swift, J., Steam Engine Makers' Society, Manchester.
Tait, H., Railway Servants' Society, Scotland, Glasgow.
Threlfall, T. R. (Councillor), Trades' Council, Southport.
Tovey, R. G. (Councillor), Trades' Council, Bristol.
Trotter, L., Colliery Mechanics' Association, Durham.
Uttley, S. (Councillor), Trades' Council, Sheffield.
Vesey, W., Saddle and Harness Makers' Society, London.
Waltham, H., Upholsterers' Trade Society, London.
Warfen, T., West End Boot Closers' Society, London.
Watmough, T., Trades' Council, Warrington.
Welch, E. W., Trades' Council, South Shields.
Wilkie, A., Associated Shipwrights' Society, Glasgow.
Williams, W. J. (Councillor), N. Wales Quarrymen's Society, Carnarvon

The following resolutions were carried unanimously:—

1.—That this Conference of Delegates from Trade Organisations throughout the United Kingdom, declares its unshaken belief in the policy of Free Trade expounded by the late Richard Cobden, and is of opinion that a return to the system of fiscal protection, in any form, would endanger the peace of the country, imperil the interests of our trading community, and be injurious to our industrial population.

Proposed by Mr. H. Slatter, J.P., Manchester.

Seconded by Mr. J. Wilson, Durham.

Supported by Mr. S. Shaftoe, Bradford; Mr. H. Tait, Glasgow.

2.—That inasmuch as State Bounties, given by Foreign Governments to their Industries, to enable them to unfairly compete against other Industries on British Markets are a violation of, and an attack upon, Free Trade principles, are ruinous in their effect upon honest industry, and force the community to rely upon artificial instead of the unrestricted natural sources of supply, this Conference calls upon the Government, consistent with the principles of the previous resolution, to adopt such measures as may be necessary to bring about the abolition of Foreign State Bounties, thereby restoring Free Trade in the markets of the United Kingdom.

Proposed by Mr. J. Mawdsley, Manchester.

Seconded by Mr. Councillor Grainger, Birmingham.

Supported by Mr. W. Matkin, Liverpool; Mr. W. Johnston, Aberdeen.

3.—That this Conference declares that, while the working classes demand no artificial fiscal advantage for British Industries, neither will they tolerate the operation of Export Bounties to Foreign Industries, and they insist that competition upon British markets shall be upon natural conditions for all.

Proposed by Mr. Councillor Uttley, Sheffield.

Seconded by Mr. J. Swift, Manchester.

Supported by Mr. R. D. B. Ritchie, Dundee; Mr. R. Knight, Newcastle.

The tone of this meeting, we are informed, was strongly in favour of the absolute prohibition of sugar from any country whose opposition to the provisions of the Sugar Convention might endanger the solution of the question. A full report of the proceedings will be printed and published.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO FEBRUARY 29TH, 1887-1888.

Board of Trade Returns.

IMPORTS.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1887.	1888.	1887.	1888.
	Cwts.	Cwts.	£	£
Germany	962,812	475,629	521,213	361,714
Holland	40,740	38,807	21,825	27,887
Belgium	241,154	140,361	123,126	98,246
France	1,534	1,006	900	1,001
British West Indies & Guiana	511,367	271,322	388,104	251,954
British East Indies	10,000	121,069	4,380	61,470
China and Hong Kong	12	....	6	....
Mauritius	18,611	39,354	8,387	26,884
Spanish West India Islands	....	60,833	....	47,436
Brazil	134,659	661,587	71,838	426,214
Java	612,603	799,570	410,004	651,449
Philippine Islands	42,202	61,900	18,066	30,795
Peru	63,273	154,190	39,278	119,277
Other Countries	97,069	108,980	53,875	81,482
Total of Raw Sugars	2,736,036	2,934,608	1,661,002	2,185,449
Molasses	19,881	20,552	5,913	7,957
Total Raw Sugars	....	....	1,666,915	2,193,406
REFINED SUGARS.				
Germany	311,833	434,434	243,112	385,324
Holland	192,204	207,862	151,802	195,116
Belgium	22,644	41,245	18,935	39,472
France	225,528	146,490	168,173	137,717
United States	36,797	3,734	30,216	3,353
Other Countries	....	8,834	....	7,150
Total of Refined	789,006	842,599	612,238	768,132

EXPORTS.—REFINED SUGARS.

	Cwts.	Cwts.	£	£
Denmark	10,791	9,046	5,825	6,788
Holland	7,423	11,427	4,941	8,822
Belgium	10,183	6,036	6,411	4,689
France	9,681	625	5,834	487
Portugal, Azores, & Madeira	13,126	16,025	7,729	12,165
Italy	18,604	6,216	11,141	4,858
Other Countries	45,873	37,398	30,046	32,060
Total	115,681	86,773	71,927	69,869

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of February, 1888, compared with the corresponding month of the two preceding years, and the average monthly imports for the past year compared with those of 1884, 1885, and 1886, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

Countries from which Sugar has been imported.	"Lumps and Loaves."							"Other Sorts." Including Crushed Loaf, Granulated, Crystallized, &c.							Total.						
	Monthly Average.				Feb.	Feb.	Feb.	Monthly Average.				Feb.	Feb.	Feb.	Monthly Average.				Feb.	Feb.	Feb.
	1884	1885	1886	1887	1886	1887	1888	1884	1885	1886	1887	1886	1887	1888	1884	1885	1886	1887	1886	1887	1888
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
France	2737	1597	1462	1363	1752	930	1867	1621	463	2688	5099	1514	3518	1517	4358	2060	4150	6462	3266	4448	3384
Holland	3580	3848	3508	3780	2294	3657	1634	1948	1472	1428	2483	1306	1548	2845	5528	5320	4936	6263	3600	5205	4479
Germany & Austria	552	808	990	1347	555	1197	1175	2380	3262	6634	10463	4838	6156	5889	2932	4070	7624	11810	5393	7353	7064
Belgium	183	189	344	592	122	484	803	151	120	113	308	82	266	274	334	309	457	900	204	750	1077
United States	962	707	854	454	743	189	..	3386	8869	5078	2804	5330	936	10	4348	9576	5932	3258	6073	1125	10
Russia	..	..	..	3	..	..	..	..	875	3412	452	10153	..	..	..	875	3412	455	10153	..	..
Other Countries	..	1	..	..	..	..	..	121	24	9	15	..	..	..	121	25	9	15	..	..	..
Total	8014	7150	7158	7539	5466	6457	5479	9607	15085	19362	21624	23223	12424	10535	17621	22235	26520	29163	28689	18881	16014

SUGAR STATISTICS—GREAT BRITAIN.

To March 24th, 1888 and 1887. In Thousands of Tons, to the nearest Thousand.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1888.	1887.	1888.	1887.	1888.	1887.
London	58 ..	73	57 ..	76	61 ..	73
Liverpool ..	119 ..	80	62 ..	58	97 ..	61
Bristol	5 ..	2	10 ..	14	11 ..	12
Clyde	41 ..	42	48 ..	49	45 ..	55
Total ..	223	197	177	197	214	201
	Increase..	26	Decrease..	20	Increase..	13

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

For the four principal Ports. In Thousands of Tons, to the nearest Thousand. For February, 1888 and 1887.

	STOCKS. March 1st.		DELIVERIES. In February.		IMPORTS. In February.	
	1888.	1887.	1888.	1887.	1888.	1887.
New York	64 ..	74	37 ..	55	47 ..	49
Boston	8 ..	13	11 ..	9	16 ..	9
Philadelphia....	1 ..	1	23 ..	13	24 ..	13
Baltimore	.. ..	..	.. ..	..	.. ..	..
Total......	73	88	71	77	87	71
	Decrease ..	15	Decrease..	6	Increase ..	16
Total for the year..			139	152	164	138

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, March 15th, 1888.

Fair Refining.	96o/o Centfs.	Granulated.	Stand. A.	Stock in Four Ports.
Mar. 15, 1888.—4¾c.	5 7-16c.	6¾c.	6¼c.	Jan. 1, 1888— 47,798 tons.
Mar. 17, 1887.—4 9-16c.	5⅜c.	5 11-16-¾c.	5 5-16-⅜c.	Jan. 1, 1887—102,279 tons.
Mar. 18, 1886.—4 15-16c.	5 9-16c.	6¼c.	5 13-16c.	Jan. 1, 1886— 57,328 tons.
Mar. 19, 1885.—4 11-16c.	5 5-16c.	6 1-16c.	5⅝c.	Jan. 1, 1885— 89,186 tons.
Mar. 13, 1884.—5 11-16c.	6 9-16c.	7⅜c.	7c.	Jan. 1, 1884— 60,900 tons.
Mar. 15, 1883.—7⅛c.	7 13-16c.	8 15-16c.	8⅜c.	Jan. 1, 1883— 50,297 tons.
Mar. 16, 1882.—7⅛c.	7 15-16c.	9 3-16c.	8¾c.	Jan. 1, 1882— 43,927 tons.
Mar. 17, 1881.—7 5-16c.	8 1-16c.	9¼c.	8⅝-⅞c.	Jan. 1, 1881— 66,999 tons.
Mar. 11, 1880.—7¾c.	8½c.	9⅝c.	9¼-⅜c.	Jan. 1, 1880— 63,558 tons.
Mar. 13, 1879.—6 5-16c.	7 3-16c.	8 5-16c.	7⅞-8c.	Jan. 1, 1879— 50,773 tons.
Mar. 14, 1878.—7⅝c.	8⅛c.	9¼-⅜c.	9c.	Jan. 1, 1878— 48,230 tons.
Mar. 15, 1877.—8⅝c.	9⅞c.	11c.	10½c.	Jan. 1, 1877— 25,885 tons.

Stocks of Sugar in the Chief Markets of Europe on the 29th February, for Three Years, in thousands of tons, to the nearest thousand.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts.*	Total 1888.	Total 1887.	Total 1886.
217	*200	26	*290	135	25	893	1076	1038

* Estimated.

Consumption of Sugar in Europe for Three Years, ending 29th February, in thousands of tons, to the nearest thousand.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts.*	Total 1888.	Total 1887.	Total 1886.
1229	418	44	414	210	337	2652	2622	2554

Estimated Crop of Beet Root Sugar on the Continent of Europe for the present Campaign, compared with the actual crop, of the three previous Campaigns.

(From Licht's Monthly Circular.)

	1888-89. Tons.	1887-88. Tons.	1886-87. Tons.	1885-86. Tons.
France	500,000	405,000	486,443	298,407
German Empire	1,125,000	910,000	1,018,842	838,131
Austro-Hungary	515,000	412,500	523,060	377,032
Russia and Poland.	450,000	430,000	479,582	537,860
Belgium	135,000	135,000	132,570	88,421
Holland	35,000	36,000	32,263	21,244
Other Countries	65,000	56,050	56,050	55,500
Total	*2,825,000	2,384,550	2,728,810	2,216,595

* A purely imaginative estimate, as, indeed, are all estimates of the next crop, at the present time, and this Mr. Licht virtually admits.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

The market during the past month has been dull, and prices generally are weaker. Beet 88%, which has been relatively dearer than cane, has fallen to 14s. 3d., the lowest point since November last year.

The operations of the American "Trust" are affecting in their own market, as well as in ours, the prices of raws, by the shipment of sugars to this country, which, under natural conditions would have gone to the States. Before many weeks are over the "trust" will be casting about for supplies of the raw material, and until then, but not before, in all probability, we shall not see very much improvement in values.

The imports of foreign refined for January and February, 1888, show an increase, as compared with the same period of 1887, of 2,683 tons—42,131 tons against 39,448 tons.

The deliveries in the United Kingdom up to March 24th have fallen off by 19,399 tons, in comparison with 1887, and the imports have increased by 13,248 tons.

The stocks in the United Kingdom on March 24th, 1888, were 222,568 tons, against 196,366 tons in 1887, showing an increase in the present stock of 26,202 tons.

Present quotations for the standard qualities, as under, are:—

	Floating.		Landed.
Porto Rico, fair to good Refining	13/6 to 14/–	against	13/6 to 14/–.
Cuba Centrifugals, 96°/ₒ polarization	14/6 to 15/–	,,	15/- to 15/6.
Cuba Muscovados, fair to good Refining..	13/6 to 14/–	,,	13/6 to 14/-.
Java, No. 15 to 16, good to strong	15/9 to 16/–	,,	15/6 to 16/-.
	Landed.		Last Month.
Madras Cane Jaggery..	9/6 to 9/9	against	10/– to 10/6.
Manila Cebu and Ilo Ilo	9/– to 10/–	,,	10/– to 10/6.

Paris Loaves, f.o.b.	17/9 to 18/3	against	17/4½ to 17/9.
Titlers	19/6	,,	19/3
Tate's Cubes	20/6	,,	20/9
Austrian-German Beetroot, 88°/ₒ f.o.b...	14/3	,,	14/7½

THE SUGAR CANE.

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☞ The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to Henry Thorp, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

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It is with much regret that we notice the death, in his 62nd year, on the 28th March, of Mr. William Russell, of Demerara. He was part owner of several large sugar estates in that Colony, and the representative of all the estates of Messrs. Sandbach, Parker & Co., and Booker Brothers & Co. His connection with Demerara dates from 1847, and the loss of his energetic spirit, and large practical experience, will be long and deeply felt.

It will be seen from the report of the proceedings of the House of Commons, April 27, that the Government, for the present at least, prohibit the use of saccharine for brewing purposes, see page 279.

We also give at page 265, the opinions of some French physicians adverse to the use of saccharine from a medical point of view.

Out of thirty Russian sugar factories which have up to now rendered a statement of last year's working, only one-half are able to declare dividends. One shows 15 per cent., four 10 per cent., seven 6 per cent., two 5 per cent., and one 1 per cent.

The death is announced of Mr. Friend, the "inventor" of sugar refining by electricity. One cannot but own to a feeling of regret, that, if there is any real foundation for what we have been told of this wonderful new process of refining, the inventor did not live to see some of the fruits of his labours. The "secret," it is stated, is known to two persons, so that those who have faith in this enterprise can still hope on.

Two Blue Books relating to the Sugar Bounties have been issued during the past month.

One, containing the correspondence which passed between our Government and various Foreign Governments with reference to the Conference on Sugar Bounties—the correspondence dates from September, 1886, to January, 1888.—Price 1s. 10d.

The other, contains Minutes of Proceedings and Papers laid before the Conference, and in addition to the minutes it gives the text of the various laws relating to the taxation of sugar in most of the European countries, together with translations into English. It also contains the Protocol signed in London, December 19th, last year, together with an annex giving the full text of the proposed convention. Price 2s. 2d.

Can be had from Eyre & Spottiswoode, East Harding Street, London, E.C., or through any Bookseller.

At page 249 we give a valuable address by Mr. David Morris, M.A., F.L.S., delivered before the London Chamber of Commerce, on "The Vegetable Resources of the West Indies," which will well repay a careful perusal. As our readers are aware, Mr. Morris was at one time the Director of the Botanic Gardens in Jamaica, and is an authority upon the subject of his address. He concludes with the statement—"For my part I have a strong confidence, a confidence in "which I have not wavered since I knew them, that a hopeful future "lies before these islands. It is within the power of many of us here "to-day to help to make that future great, and to bring back some-"thing at least of the departed glory of these West Indian Islands."

We have received Bulletin No. 17 of the United States Department of Agriculture, Division of Chemistry, containing reports of experiments in the manufacture of sorghum and cane sugars at Fort Scott, Rio Grande, and Lawrence, under the superintendence of Mr. H. W. Wiley. We have not space this month to do more than give some of the conclusions arrived at (see page 275). With this pamphlet is given, as an appendix, the report of Mr. W. J. Thompson, of Bayou Teche (Louisiana), on "Brown Coal and Wood Char in the filtration of Cane Juices and Syrups."

A special meeting of the West India Committee (London), was held on the 20th ult., for the purpose of considering what steps should be taken to secure conformity on the part of traders and retailers with the provisions of the Merchandise Marks Act, in respect of the sale of sugar, "in consequence of the large quantity of artificially-dyed sugar which is being sold in the London market, in imitation of the fine West India and Demerara crystallised." It was decided to take legal opinion as to what steps should be adopted to safeguard the interests of the colonies on the one hand, and those of the public on the other.

The following is a copy of a circular issued by the United States Treasury Department, on the 13th February last, respecting the rate of drawback on refined dried sugar:—

"The rate of drawback, provisionally established by the circular of September 28th, 1886, on all refined loaf, cut-loaf, crushed, granulated, and powdered sugar, stove-dried, or dried by other equally effective process, viz., two and sixty-hundredths ($2\frac{60}{100}$) cents per pound, less the legal retention of 1 per cent., is hereby declared to be permanent."

At the meeting of the Louisiana Sugar Planters' Association, held at New Orleans, in March, the following resolution was proposed and adopted:—

Resolved, That the Mills tariff bill, reducing, as it does, the average duty on refining sugar 20 per cent., and reducing the duty on sugars competing in colour with Louisiana sugars, an average of 47 per cent., threatens our industry with immediate destruction, and we earnestly urge upon our delegation in Washington, and upon all the friends of the Louisiana sugar industry, and those whose interests may also be threatened, to use all proper means to assist us in averting the disaster.

The International Sugar Congress resumed its labours in London, on the 5th of last month, nearly all the representatives being present.

The President, Baron de Worms, communicated to the representatives and delegates the replies received from all the Governments, and also the assent of India, and the British Colonies and Possessions, to the proposed convention.

The assent of the Colonies, says the *Deutsche Zuckerindustrie*, puts an end to that reservation, which has in very many instances been used by those friendly to the premium system, to throw suspicion on the proceeding of the English Government. There seems to be no ground whatever for this suspicion, as far as we can see, for the interest of England and the object to be pursued by her Government are clearly evident. In face of the premiums granted by beet sugar producing countries, neither the English refiners, nor the sugar planters of the English Colonies, can in the long run continue to exist; hence her seeking to do away with premiums, so as to permit a competition based on natural principles, is consistent not only with the urgent demands of these seriously threatened interests, but also with her duty. If any of the industries of the beet-growing countries were in like manner threatened by the premiums granted in foreign countries, they would be met not by adopting the slow and doubtful course of an international agreement, but by levying increased customs duties, a course which has already been adopted in France and Belgium with regard to German and Austrian sugars.

In our opinion, the efforts of the English Government deserve the full support of Germany, less on the special ground that the abolition of all premiums would be very advantageous for the German sugar industry, which gets the lowest premiums of any, than because the premiums place the various industries in a position to sell under the cost of production, and consequently, the natural formation of prices which regulates the extent of the production is prevented.

The Bulletin des Halles states that the Conference commenced to discuss the Convention, adopted on the 19th November, article by article, and that Article I. was agreed to. After this, the action of the United States, which for the present desire to reserve their freedom, and that of Russia, with regard to the export over her Asiatic frontier, were discussed. Having adopted the principle of the complete abolition of the premiums, the Conference adjourned to consider, individually, what measures are best adapted to carry out the principle agreed to, having referred to a committee, the task of drawing up more accurately Article II. of the proposed Convention. This article, says the *Journal de Fabricant des Sucre*, relating to the duty on consumption, tends to nothing less than the complete overthrow of the fiscal systems in force among the beet-growing nations of the continent, for the profit of no one but of England and her Colonies; and the satisfactory drawing up of such a clause has hitherto been absolutely beyond the powers of men equally experienced and skilful with the present delegates to the Conference.

THE TRADE COUNCILS AND THE SUGAR CONFERENCE.

The following letter has been addressed to Lord Salisbury by the British Sugar Refiners' Committee:—

The Most Honourable THE MARQUIS OF SALISBURY, K.G., &c., &c.

My Lord,

I am desired by the British Sugar Refiners' Committee to call your Lordship's attention to certain passages in the speeches of the Delegates of the Trades Councils at the recent Trades Conference on Foreign State Bounties. It appears from the verbatim report of the Conference, which has been sent to us, that the general feeling of the Delegates was in favour of Her Majesty's Government proposing, in the event of any Country standing in the way of the conclusion of a Convention, to prohibit the importation of sugar from that country until it should withdraw its opposition.

As your Lordship is aware, we have always urged, with the view of securing the success of the negotiations, that a duty to countervail a bounty would, in the words of a high authority, be "not only consistent with Free Trade but positively conceived in the interests of Free Trade." We are, however, quite ready to admit that the measure suggested by the representatives of the Trades Councils would attain the same object, namely, the success of the negotiations, equally well, and would perhaps be more consistent with precedent and more easy of application.

The following are the passages in the speeches to which we desire to direct your Lordship's attention:—

Mr. MAWDSLEY (Amalgamated Operative Cotton Spinners, Manchester): "What I want is a fair, honest settlement of this question; but whether it be the sugar industry, the shipping industry, the iron industry, or every one in turn, I say that whenever we find ourselves attacked by this system of striking below the belt, it is our duty to use every legitimate means of protecting ourselves, and in this case the means are in our hands if we will only use them."

Mr. GRANGER (Trades Council, Birmingham): "But we may take a lesson from our neighbours across the Irish channel, and can keep the sugar out of this country altogether and boycott it. I am very certain that if the working-men say they are determined in this matter, and if France says she will not agree with the other nations to abolish this bounty, then we will say to France, 'We do not want your sugar; keep it; but we will not trench upon our Free Trade principles and practices, whether you or others do so. But we have the right and power to prevent your bounty-fed goods from coming into Great Britain, and that power we will use in self-defence.' This is a way out of the difficulty; and whilst I sympathise with the idea that we should not endeavour to do anything to harass any other nations, it seems to be the only possible alternative. . . . . . If any nation will say that she will not discontinue these bounties, then we shall insist upon our Government taking direct means to show any such nation that honesty is the best policy, and will be the most profitable."

Mr. MATKIN (Liverpool): "I think that there should be no mistake, there should be no uncertain sound go forth from this meeting; that we shall have to adopt some measure, such as has been suggested here this afternoon as to what we do in case of a trade dispute; that we should summarily boycott them, or something of that kind. We must not allow this thing to go on."

Mr. JOHNSTON (Trades Council, Aberdeen): "By artificially stimulating this industry it is bound to be ruinous in its effect upon honest industry. I think that this Conference should urge upon the Government to take such measures as would prevent the violation of Free Trade."

Mr. FREAK (Trades Council, London): "I say that these bounties are injurious to the true interests of the people. I do not care what means are adopted to do away with them. I should use every means to destroy the artificial bolstering up of an industry, and I should endeavour to promote free interchange between country and country. Any artificial means of bolstering up an industry is detrimental to, and is the opposite of Free Trade. I do not care what you call it, but I would bring about the natural exchange of the industries of the world and the produce of the world, and I call that Free Trade. I can support the proposition, believing that whatever is done, as long as it does not encourage unnatural production but merely prohibits unnatural interference with a thing, is strictly in accordance with Free Trade principles."

Mr. SWIFT (Steam Engine Makers Society, Manchester): "I give my full adherence to the resolutions adopted, as none of us here fear foreign competition so long as it is based on right principles. There are no two opinions amongst the great body of the working classes.

We should retaliate upon those countries. We do not object to the foreigner adopting his own plan in his own country as to bounties, but we do object to the bounty-fed goods being sent into this country at less than their cost, twice the difference being made up by imperial taxes, under the title of bounties to foster native industry, and that to the detriment of the British workman."

Mr. Bloor (Tool makers, &c., Society, Birmingham): "I believe that we are in the right direction, and I should have stated precisely the same as my colleague did in seconding that resolution. We should practise the same doctrine abroad that we practise in our own organisation, and that is this,—if nine manufacturers out of a dozen accept certain propositions, we boycott the other three. We should preach the same doctrine to other countries. If they do not feel inclined to bow to the wish of the majority of the nations they must accept the inevitable—they must take the consequences."

These extracts show that there was a very general agreement among the Delegates of the Trades Councils, that if any one or two countries were to place obstacles in the way of the proposed general abolition of bounties it would be right, in the interest of Free Trade, to prohibit the importation of their sugar until they withdrew their opposition to the conclusion of a Treaty.

We therefore earnestly trust that Her Majesty's Government, fortified with this distinct expression of opinion on the part of the recognized leaders of the working classes in this country, will not hesitate to take up a firm attitude, and to indicate unmistakably that no sudden obstruction to the hitherto successful progress of the negotiations will be permitted.

I am, my Lord,
Your obedient servant,
George Martineau.

21, Mincing Lane,
April 25th, 1888.

At page 266 we give a short notice of the proceedings of the Conference of the Trade Councils, with the three resolutions which were submitted, and with which some slight alterations were unaminously adopted.

THE SUGAR INDUSTRY IN PERNAMBUCO.

The following interesting particulars respecting the sugar industry in Pernambuco are extracted from a letter from Mr. Hans Nitsch, which has recently appeared in the *Deutsche Zuckerindustrie*:—

It is a well known fact that Pernambuco occupies the first position among the sugar producing provinces of Brazil. The total production of that country is now estimated to have reached fully 350,000 tons, the largest half of which is supplied by Pernambuco.

The portion of the province adapted for sugar cultivation is chiefly a narrow zone lying along the coast, the rest being more or less unfit for cane growing, in addition to which the high cost of transport would be prohibitory. The planting commences towards the end of the rainy season and the beginning of the dry season, *i.e.*, in the months of July and August, the plough or hoe having to be frequently used to keep down the weeds until the cane ripens, which occurs at the end of about 15 months. The year after the first cutting, a second, and generally a third cutting takes place; further cuttings are possible in specially fertile spots, but do not form the rule. The yield of each progressive cutting is generally less than that of the one preceding.

The kind cultivated is almost exclusively, the *Canna Cayanna*, which is superior in saacharine richness to all other sorts. The writer found in March last year, when the saccharine matter had already proportionably diminished, as much as 20·6 per cent. of sugar in the juice, with a degree of purity of 95·4; and in January this year as much as 23·5 per cent, the purity being 96·7. No other kind has yet come up to this, though some that are being tried in certain localities, owing to a peculiar disease having shown itself in the *Canna Cayanna*, are said to be improving. In some favoured districts, the yield of cane per hectare (2½ acres) is said to have reached 75·8 tons of the first cutting, and 60·65 of the second, equivalent to 30¾ tons and 24¼ tons per acre.

The data for calculating the cost of production are not very accurate, but it seems that weeding and planting cost per wagon load of cane plants $20; hoeing two or three times, $10; cutting, $10; total, $40. The wagon load is estimated to be equal to about 10 tons of canes, which would give about 4 milreis, or 17s. 8d., per ton of cane. To this must be added the commission levied by the government for the trial of the diffusion process; if the planter is compelled to sell at this price or, as was last year the case, even under this price, he would no doubt cut the canes already planted, but hardly plant afresh, were it not that he has no other kind of cultivation to turn to.

Whilst it is right to speak in high terms of the manner of cultivation in Pernambuco, especially as compared with other provinces of Brazil, precisely the contrary must be said of the manufacture. It is perfectly incredible what an antediluvian state of affairs prevails, and what unheard of waste of the precious raw material takes place. The writer is of opinion that at least four-fifths of the total sugar produced is obtained with the most primitive machines, with which it is scarcely possible to extract more than two-fifths of the sugar in the cane.

Every man possessing an estate of (as a rule) 484 hectares, say 1,200 acres, has his own factory, in which he crushes the cane grown by himself and his *lavradores*. These are a sort of bondmen, who are pledged to have the cane grown by them crushed at the proprietor's factory, they receiving half the sugar obtained, the other half going to the landlord.

The mills, frequently driven by water power, extract only about half the juice, which runs into a collecting vat. This is from time to time emptied into the first pan of the so-called "Assentamento," a row of about 5 iron pans, fixed in masonry, standing one higher than the other, so that what boils over in one runs into the next, whilst the juice has to be ladled out by hand. The fuel employed is dry bagasse. In the first and coolest pan, homœopathic doses of lime are added, in the following pans the juice is continually thickened by skimming, until finally the syrup obtained is transferred into two detached iron pans, from which large clay, iron, or wooden moulds are filled. The syrup is either allowed to run off naturally from the loaves thus obtained, or clarified with moist clay, and after being dissolved, the clarified part is carefully separated from the rest, and both set to dry in the sun in large flat boxes. A second product is frequently obtained from the syrup which has run off, which is called according to quality, *cruto ordinario* or *retame*. The latter no one would dignify with the name of sugar. The syrup finally remaining, if not used, with the scum, for fodder, is then distilledinto 60° brandy.

It is clear that with such a system the yield can be but small, and it is only in consequence of the excellent quality of the cane that it after all amounts to 7½ %.

There are only very few factories that possess improved machinery, and those which use steam apparatus, vacuum, turbines, &c., may be counted on the fingers.

At the time when the government, in order to encourage the erection of so-called "Engenhos centraes," guaranteed the payment of 6% interest on the capital laid out in these central factories, the industry in Pernambuco seemed to be about to undergo considerable development, and such would certainly have been the case, if the concessions then granted had come into the hands of practical men, and not into those of unprincipled speculators. The latter commenced by purchasing in Egypt, the machinery for six large factories, able to work up from 250 to 300 tons per day, which however had lain in the sand, exposed to sun and weather, since the fall of the deposed Khedive. After four of these had been put together and set up in the most ridiculous fashion, they finally got to work in November, 1884, under incompetent management, the result being just what had been expected.

These four factories lay only a few miles apart from one another, and so the cane worked up was pretty much the same in each case. The yield in sugar obtained in 1885-86, was

At Cabo..	5·08	per cent. of the cane.
,, Escada	7·03	,, ,,
,, Cuyambuca	8·60	,, ,,
,, Bom Sosto	5·06	,, ,,

Besides burning the whole of the bagasse and a large quantity of wood, they consumed in coal the following percentage of the weight of cane:—

Al Cabo	10·16	per cent.
,, Escada	7·92	,,
,, Cuyambuca	6·15	,,
,, Bom Sosto	9·61	,,

When it is further considered, that along with these scandalous results, the work was carried on exceedingly irregularly, that the most unheard of extravagance characterised the payment of wages and the whole of the expenditure, no one can wonder that the company was bankrupt in the third year, and that there was naturally an end of the erection of any more *Engenhos centraes* with guaranteed interest.

Another English company has at least managed to keep one of the factories, so made over by concession, in regular work, apparently with a tolerable result, but they are said to have expended up to now not less than 4,000 centos of reis (£400,000) in the purchase and transport of the machinery for two other central factories which have yet to be erected.

Two smaller factories were put up with French capital and machinery which being economically conducted under practical management, have yielded very satisfactory financial results.

The following table shows the prices which the planters are getting for sugar per 15 kilos. franco at Recife-Pernambuco, exclusive of sacks:—

	$		$
Usina Pinto	....		2.700
Colonia Isabel	2.500	to	2.700
Turbina pulverisado (crushed turbined).	2.300	to	2.400
Branco terceiro (white thirds)	2.100	to	2.900
Somenos	1.700	to	1.800
Mascavado	1.540	to	1.600
Bruto	1.300	to	1.360
Retamo	800	to	1.100

The two first kinds, the best price obtained for which is equal to 20s. per cwt., are good, dry, almost white sugars, with a sharp grain (see analysis below), and come from the two newly erected French factories referred to. These and the two next kinds are either consumed here or sent to the Southern provinces, the three last alone are exported to the United States, and amount to at least three fourths of the entire production. The highest prices now obtainable for these are 11s. 10d., 10s. 0d., and 7s. 6d. per cwt. respectively.

The following analyses of the kinds of sugar most generally met with in Pernambuco were made with the freshest samples obtainable. In two cases where the ashes far exceed the normal quantity, there was a large percentage of sand:—

	Sugar.	Glucose.	Ash.	Water.	Organic Matter.
Colonia Isabela Prima	99·6	0·00	0·08	0·10	0·22
Crushed White Turbined	98·7	0·73	0·11	0·30	0·16
White, second sort	97·4	1·28	0·20	1·04	0·08
,, thirds, superior	98·0	1·20	0·10	0·70	0·00
,, ,, good	98·0	1·00	0·15	0·76	0·09
,, ,, good	97·9	1·43	0·40	0·23	1·04
,, ,, regular	97·7	1·07	0·41	0·77	0·05
Colonia Isabela Segunda	98·0	0·77	0·26	0·32	0·65
Somenos	95·6	1·36	0·59	1·80	0·65
Mascavado	94·4	1·82	1·09	2·51	0·19
,,	94·6	2·06	0·86	1·98	0·50
Turbined Mascavado	92·4	1·45	0·69	2·74	2·72
Bruto bom (good raw, sun-dried)	90·3	1·85	1·51	4·27	2·07
,, ,,	86·5	4·24	2·02	6·77	0·47
,, ,,	85·5	5·05	1·02	8·37	0·16
Bruto ordinario (common raw)	79·1	7·18	4·34	8·93	0·44
Retame	68·7	13·16	1·57	9·84	6·73

SIR D. CURRIE, M.P., ON SOUTH AFRICA.

A meeting of the Royal Colonial Institute was held on April 10th, in the Whitehall Rooms of the Hôtel Métropole, when a paper on "South Africa" was read by Sir Donald Currie, M.P. Lord Brassey presided, and among the numerous company present were—Lady Currie, Sir G. Baden-Powell, M.P., Sir Henry Barkly, Sir J. Coode, Sir Frederick Young, Sir Francis Smith, Mr. Kimber, M.P., General Brackenbury, Commander Bethell, M.P., Mr. Giles, M.P., Mr. A. M'Arthur, M.P., and Mr. Hugh Watt, M.P.

The Chairman, in introducing the lecturer, said that Sir D. Currie had lately visited South Africa, and he was only doing his duty in giving the members of that Institute the advantage of hearing the conclusions at which he had arrived.

Sir D. Currie, in opening his paper, said that the political circumstances of the time rendered the task before him a difficult one, as, in addition to the Imperial interests concerned, there were questions now under discussion between the different States and Colonies of South Africa which involved delicate issues.

Proceeding to contrast the relations of the two South African Republics with Cape Colony and Natal eleven years ago with the relations which exist at the present, he remarked that the political troubles connected with the Zulus, the Basutos, and the Transvaal were succeeded by a period of commercial depression. This, however, had now changed, and, just as in 1872, the Cape Colony took a start from the discovery of diamonds, so South Africa had again made a leap forward through the acknowledged possessions within its boundaries of untold wealth in gold.

The total value of exports from Cape Colony in 1887 showed an increase of £744,639 and the imports showed an increase of £1,241,567 over the previous year. In like manner Natal had also made progress, and the revenue from Cape railways showed a considerable increase. This improvement might be owing largely to the increased production of gold, the value of the export of that metal, which amounted in 1871 to £670, having amounted to £223,487 last year. He ventured to think that there was practically *no limit to the production of gold in South Africa.* The diamond mines also held an important place in the resources of South Africa, the yield of diamonds from the Kimberley mines from 1871 to 1885 having amounted to about £20,000,000.

The copper mines, too, were very valuable, while the country also produced coal, silver, lead, and other useful metals. With regard to the possibilities of the cultivation of the vine, he thought that there was no part of the world where the wine industry had a better chance of success than in South Africa.

After referring briefly to the production of wool and the ostrich farming industries, the lecturer proceeded to refer to the establishment of railway communication. The great question under discussion in South Africa at the present time was how and where to establish the routes to the interior; and he thought that if the seacoast ports and, indeed, the Governments of the Cape and Natal were less in rivalry there would be an easier solution of the railway question. The people of Natal held with a tenacity, peculiarly British, to the claims of their own colony, and they claimed a special position in relation to the trade of the interior; but he ventured to think that it would be better for all concerned, including the interests of this country, if the Cape and Natal could see their way to a union of interests, and, indeed, a complete union of government. Both these colonies, as well as the Imperial interests, had run serious risks in the last few years from the efforts of foreign Powers on the western and south-eastern coasts to obtain political influence and territory. If they had been united a more definite position could have been taken up by the Colonial Governments in relation to the pretensions of Germany and Angra Pequena. In conclusion the lecturer urged that our position in South Africa naturally depended upon the friendship of the population and upon our providing suitable defences upon the sea coast. (Cheers.)

A discussion followed the reading of the paper, in which Mr. Edward Jones, Mr. Francis Dormer, General Brackenbury, Sir G. Baden-Powell, M.P., and Dr. Clark, M.P., took part.

Lord BRASSEY said that South Africa in days not very long since was a melancholy topic for English statesmen and writers, but now Sir D. Currie had been able to place before them a very gratifying picture. We were advancing into the centre of Africa, not only from the Cape but from Zanzibar, and were making great progress in the development of our trade from the eastern side of the African continent. It was gratifying also to learn of the growth of friendly relations with tribes and nationalities with which we were a few years ago engaged in conflict. He attributed these results to the fact that we have left the colonies, at least in relation to their internal affairs, to the management of those who are on the spot. The same principle of non-intervention did not apply, however, to the question of defence. He understood that the Government was prepared to go forward as rapid as practicable with the completion of the defence of our coaling station at the Cape, and he congratulated the country upon that fact. But, for the effective defence of Table Bay, it was necessary that we should be secure at Simon's Bay. We had to hold the two positions, and to do so with the least possible amount of military force, they required railway communication between Winburg, and where our troops are stationed, Simon's Bay. What was wanted was a short line, costing some £50,000, or less, connecting the cantonment at Winburg with Simon's Bay, and he hoped the Imperial Government would not hesitate to incur this very necessary expense.

The proceedings closed with the usual vote of thanks.

TARIFF REVISION IN THE UNITED STATES.

The *New York Herald* for the 2nd March last contains the text of the Bill for the revision of the Customs tariff of the United States, together with a report by Mr. Mills, Chairman of the Ways and Means Committee, on the same. The following is an extract from the report in question:—

"The Bill does not contain any provision for a modification of the internal revenue laws. We had completed the tariff sections, and on account of the general interest in the matter thought best to report them at once. The reductions in revenue proposed by this Bill aggregate about $50,000,000, according to the method of computation which we adopted; that is, taking the imports of each article in the last fiscal year on which we propose a change of duty, we compute the receipts from duties on the same quantities or values of goods at the new rate, and deduct it from the actual receipts from imports on those articles during the last fiscal year.

"I recognise fully that such a method of computation cannot disclose absolutely the effect upon the revenue of new tariff legislation, but I think the result will come much nearer the actual figures than any result based upon purely theoretical computations of increase or decrease of imports with changed rates.

"The trouble with such computation is that there are no data for the premises. Such computations have been attempted in previous cases when tariff Bills have been reported, but they have almost always proved exceedingly misleading. We have presented figures, which are substantial as far as they go.

"Of course, where additions are made to the free list, as is the case with many of the changes we propose, our computations of decrease of duty are absolutely correct, for there can be no duty collected, no matter how many times importations are multiplied.

"I said that the aggregate reductions proposed by the Bill were about fifty millions. We intend, however, to re-enact the old package clause providing for a duty on packages, which was omitted from the Tariff Act of 1882. This clause, as you are aware, does not lay a special tax on packages of different kinds, but merely provides that the value of the goods and duty be assessed upon them accordingly. This will add from five million to ten million dollars to the revenue, so that the net reduction of revenue proposed by the Bill will not exceed forty-five million dollars.

"I think it is the opinion of the majority of our committee that the revenue of the Government should be reduced not less than $70,000,000. We have therefore left $25,000,000 to be disposed of by changes in internal revenue taxation.

"As regards reductions of revenue in detail we have not completed the computation down to the last figure, but I can give them in round numbers. Additions to the free list comprise the largest item, and they aggregate $22,250,000. The other reductions are sugar, $11,000,000; woollen manufactures, $12,000,000; china and glassware, $1,600,000; chemicals, $750,000; cottons and cotton goods, $1,500,000; iron, $1,000,000; sundries, $500,000; total, $50,900,000. There are some small items which I have omitted, but the receipts from them are insignificant in amount.

"In my opinion the effect of the Bill, if passed, will be exceedingly beneficial to our leading manufacturing industries, and will be harmful to none which are possible of healthy development in this country. I will explain this more fully when I come to the woollen schedule, for I want to say a word as to the effects upon each important class of dutiable articles.

"It will be found, when examined in detail, that the reductions of duty upon manufactured articles are comparatively few, and are so made up in a number of cases as to no more than offset corresponding reductions upon the materials entering into the manufactures. We have in some few cases made a slight increase of duty in order to correct discrepancies or modify the effects of rulings made under the present law by the Treasury Department. We have corrected what is called the schedule, but there is a reduction of duties in that schedule which partially offsets it.

"We have, where it was practicable, substituted *ad valorem* for specific duties, with a view to a more just distribution of the tariff burdens. A specific duty falls just as heavily upon the cheaper as upon the more costly articles, and operates to tax the poor man as much for a poor article as the rich man is taxed for a much better one.

"We have incorporated into this Bill administrative features substantially like those of the Hewitt Bill, which was before the last Congress. They are designed to prevent frauds by importers and will undoubtedly have a beneficial effect.

"We have taken the tariff of 1883 as a starting point of comparison. That has obviated the necessity of giving all the schedules in detail again. We give the free list in full, and give a list of the articles upon which the rate of duty is changed, with the new rate proposed. In all cases where no change is provided for in the Bill the rates remain the same as fixed by the Act of 1883.

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"In the case of sugar there is a reduction which amounts to about 22 per cent. There are changes in three respects. The classification is changed so that all sugars up to No. 16 Dutch standard are subjected to one rate, and the rate is lowered both by the pound and for the additional degrees of strength shown by the polariscope. By the existing tariffs all sugars not above No. 13 Dutch standard in colour testing by the polariscope not above 75 degrees pay one and four-tenths cents per pound, and for every additional degree or fraction four-hundredths of a cent per pound.

"We propose, as I said, to change the classification and to make the figures respectively one and fifteen-hundredths cents and three-hundredths of a cent. The rate on the higher grade of molasses is reduced from 8 to 6 cents per gallon, and all kinds of confectionery are put in one class and taxed 40 per cent *ad valorem* instead of 50 per cent."

In the April number page 202, we gave in detail the present and the proposed tariff on sugars.

THE VEGETABLE RESOURCES OF THE WEST INDIES.

An Address by Mr. D. Morris, M.A., F.L.S., *delivered before the London Chamber of Commerce on Tuesday, March 27th, 1888,*

J. Anthony Froude, Esq., *in the Chair.*

For the last ten years I have been closely connected with the development of subjects of a botanical, horticultural and agricultural character in the West Indies, and I am glad to offer a contribution towards a better knowledge of the circumstances of these islands. I do this, chiefly, in the hope that a consideration of these circumstances will enlist the interest of the London Chamber of Commerce, and of other bodies in this City of London whose concern it is to deal with the productions of plant life.

I purposely confine myself to speak of the vegetable resources of the West Indies, in order that my remarks may be wholly directed to the particular department in which I have chief knowledge and experience; and also that I may at once indicate the direction in which I believe the future prosperity of these islands to lie. The mineral resources of the West Indies appear to be comparatively unimportant. The true wealth of these islands evidently is bound up with the products of the soil, and in such horticultural and agricultural pursuits as are directly connected with plant life. This has been so in the past, and there is every indication that it will be so in the future.

Present Condition of the West Indies.

The present condition of productive industries in the West Indies is admitted to be far from satisfactory. It is needless to dwell on the political, social and fiscal conditions which have operated to bring about the depressed condition of these industries. It is more to the purpose now to realize that these islands are geographically so well placed as to be within reach of the best markets of the world; that they possess both soil and climate which are possessed by few tropical colonies; that they are inhabited by a labouring population, rightly controlled and judiciously managed, capable of producing ten times their present exports, and that they have England, the richest country in the world, to aid and support them. If they once realised these facts, and overcame the spirit of despondency which has so long possessed them, their condition would soon be improved.

These are the nearest of our tropical possessions, as also the oldest. In the past they yielded such wealth as greatly contributed to make the mother country the commercial mistress of the world. But this wealth was yielded under circumstances which were exceptional, and which have now entirely passed away. They had a monopoly of the markets of the world. "Prices then ruled artificially high as now they rule artificially low." But, although the markets for West Indian produce are so greatly changed, it must be borne in mind that the islands themselves as regards the capabilities of the soil, their available labour, and their general resources are exactly where they were. Under ordinary conditions the keen competition, of to-day should not affect the West Indies more unfavourably than it affects other tropical countries. The chief reason why the competition is more severely felt in the West Indies than elsewhere is to be found in the fact that they have most bravely—but in many respects most unfortunately—staked their prosperity on an industry which brought them into competition with countries equally well placed with themselves as regards soil and climate, but perhaps better placed than they were as regards capital, as regards labour, and such mechanical appliances as were specially suited to the industry. If they had had other large industries to fall back upon the depression in one would not have been so severely felt. But the whole attention and energy of the islands had been so long devoted to the production of sugar that it was not surprising that they could not easily change. Even at the present time a capital of something like fifty millions sterling is said to be invested in the sugar industry of the West Indies, and it would be folly to suppose that this capital should be sacrificed unless it was felt to be absolutely impossible to save it. I fully recognise the fact that the chief business of the West Indies is that of sugar. I also realize that the people are naturally reluctant to relinquish an industry, which, in the course of more than a century, has become thoroughly established among them. They are familiar with all its details, and much of the sea-board land in the West Indies is perhaps better adapted for the cultivation of the sugar-cane than any other plant. Having admitted so much, it is, however, impossible to overcome the plain teaching of facts. No colony or set of colonies can now-a-days be permanently prosperous if entirely dependent upon a single industry.

There are now such rapid developments in production, while distribution is so highly organised by the aid of the telegraph and steam navigation that a good market anywhere can remain good only for a certain time. Good prices quickly stimulate increased production in tropical as well as in other industries. Hence it is more important than ever for these islands to provide for the fluctuations in prices, and fortify themselves against a falling off in demand in a single product. This can only be done by a variety of cultures. This, I venture to believe, must be the future policy throughout the West Indies.

It is necessary, however, as a first step, to place the sugar industry on a satisfactory footing. If, as there is every probability now, the continental sugar bounties are abolished, the West Indian planters will feel that one at least of the depressing influences with which they have had so long to contend will be removed. It is too soon yet to estimate exactly what influence the abolition of bounties will have upon the sugar industry in the West Indies. It is evidently a step in the right direction, and those who have taken part in the negotiations, and assisted in securing the results so far attained deserve the thanks of all colonies interested in the sugar-cane industry.

We may assume that eventually a better market will be obtained for colonial sugar. It would, however, be very unwise to count too much upon this. The area of production of cane-sugar is now so vast, and it is capable of being so easily increased, that in a few years the competition may be as keen as ever. A hope is still, I believe, entertained of a reciprocal treaty with the United States. The latter, it is thought, might be disposed to admit West Indian sugar free (or at a reduction) of duty on condition that the islands removed the duty on American food stuffs. Probably the islands by such a treaty would gain more than they would lose. It must be remembered, however, that cane sugar is being largely produced in the States already, and that the cultivation of beet is now being attempted there. We have heard also a great deal lately of Sorghum sugar. Of the future of this we know nothing. It is possible, therefore, that the American market may not prove so advantageous to these islands as is now supposed.

IMPROVEMENT OF THE SUGAR INDUSTRY.

Apart, however, from the abolition of sugar bounties, and securing a reciprocal treaty with America, it is well to point out that a permanent improvement in the sugar industry of the West Indies is a matter very much in the hands of the planters themselves. By planters, I include proprietary interests at home as well as those resident in the islands. Many efforts have already been made to economise the cost of production. But in all the islands there is necessary a concentration of all the purely manufacturing processes of sugar-making under what is known as the *Usine* system. This system possesses the merit that it keeps the purely agricultural work of growing the canes distinct from the purely manufacturing process of making the sugar. Where a large sugar-making factory is worked with the best machinery and highest scientific knowledge, finer and better qualities of sugar are produced while the cost is diminished.

At present, every small estate carries on its own process of sugar-making. The machinery is often primitive, and the quality of sugar necessarily low. If groups of estates were formed to grow canes, and sell them at a certain rate per ton to the Usines, the results would be most beneficial to all concerned. Usines are already in existence in Trinidad, St. Lucia, and British Guiana. Many could be worked in Jamaica where at present not one exists. In all the islands the Usine system offers a solution of many problems connected with the West Indian sugar industry. Should there be a revival in the industry, this is one of the first points that deserves attention. There are, of course, many isolated estates where the Usine system is not practicable, and in Jamaica there are estates making the best qualities of rum that would possibly find the Usine system altogether unsuitable.

Much of course depends on the kinds and varieties of canes kept under cultivation. The West Indies have been singularly free from diseases amongst canes. No destructive fungoid or insect pests have appeared among them as in Mauritius and other sugar-producing countries. The canes have been hardy and productive. Local deteriorations have no doubt arisen through poverty of soil or other unfavourable circumstances. This latter has been sought to be met by the introduction of new varieties of canes from other countries. It is well known that the sugar-cane does not produce seed, and hence it is impossible to improve it by any processes of hybridizing and crossing found so beneficial in other plants. If the sugar-cane was capable of being improved purely by cultivation and experimental processes like those which have improved the beet, this would be one of the most effective means of benefitting the industry.

New varieties amongst sugar canes arise generally in the form of bud variation. These occur very seldom, and possibly amongst several thousand acres of canes not one cane will be detected as exhibiting any well-marked characteristics. Planters, however, should be keen to mark any canes that show a departure from the types, and cultivate them separately.

At present we have to fall back on the varieties of canes possessing certain well-marked qualities which have arisen under natural conditions in other countries, and we introduce these in the hope that they may prove richer in saccharine properties than those already cultivated. The rest is in the hands of planters, engineers, and chemists, the latter of whom are especially charged to extract from the canes all the sugar they possess. This problem has not yet been solved in spite of all our appliances. Possibly at the present time no part of the world is so well provided with different varieties of canes as the West India islands. Since 1870 an experimental plantation with some 60 to 70 varieties of sugar canes has been maintained under the charge of the Botanical department of Jamaica.* The canes were obtained direct from Mauritius, Queensland, Southern United States, and some from Kew. These were grown in quarter or half acre lots. Their characteristics were noted, their merits carefully investigated by planters and chemists, and the results published for general information. This experimental plantation, maintained for 18 years, is still in existence. The canes grown and propagated at Jamaica have been distributed not only in the island itself but throughout the West Indies. It is necessary here to emphasise the fact that since 1870 numerous varieties of sugar canes have been introduced by the Jamaica gardens; they have been propagated by them and distributed by them not merely in a cane or so of each variety, but in quantities of hundreds and thousands to individual planters. At the Trinidad gardens the experimental culture of new canes was began in 1872. In 1884 farther supplies of new canes were received from Kew and distributed in the island. At British Guiana in 1881, soon after the gardens were started, new canes were introduced for experimental culture, some by the Government and others by the Hon. A. C. McCalman. The Government analytical chemist has carefully examined and reported upon them in a document of considerable interest and value. The Botanical station at Barbados, established in 1885, with about 90 acres of land attached to it, has been wholly devoted to the experimental cultivation of new sugar canes. These were received from Jamaica. The experiments here have been directed not only to the relative merits of new and old canes, but also to the effects upon them of certain manures. The The reports have been prepared with great care by Prof. Harrison, and published by the Government of Barbados, and widely reproduced in the press. This is a brief outline of what has been done from the botanical and chemical side to aid sugar planters in the West Indies. It is a record of service which, as far as I am aware, is unique in the history of the sugar-cane industry. The details of cane cultivation are so well understood in the West Indies that the planters once supplied with a good variety of canes are well able to grow them, and indeed are in a better position to judge of their actual merits than any one else.

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* A descriptive list of sugar canes cultivated in the Jamaica gardens was given in the *Sugar Cane* for November, 1887, page 577.

Introduced Plants.

Although the native flora of the West Indies includes many valuable plants, it is remarkable that nearly all the vegetable productions of these islands at present are derived from exotic plants introduced from elsewhere and kept under cultivation. The sugar cane itself is of Asiatic origin. Its introduction to the West Indies is clearly traceable in historic records. What is called Otaheite cane, also known as the Bourbon cane, was introduced to the English islands at the end of the last and the beginning of the present century. Captain Bligh brought the sugar cane and bread-fruit from the Pacific in His Majesty's ships in 1796. These and other plants on arrival were carefully tended, and distributed from the Jamaica Botanic Gardens by Wiles, a gardener selected by Sir Joseph Banks. The introduction of coffee to the West Indies we owe to the French. Logwood was brought from British Honduras to Jamaica by Dr. Burham, a botanist, in 1715. The export of logwood from this island now exceeds that of British Honduras, and amounts to £190,000 annually. Dr. Clarke, the first island botanist, brought with him to Jamaica the jujube tree and the camphor tree. The first mango plants were brought by Lord Rodney; while Dr. Marten in 1788, introduced the clove and black-pepper. Jamaica ginger had its origin in the East Indies. Cacao is indigenous to none of the islands, and in Jamaica, at least, owes its recent increase in culture to the action of the Botanical Gardens. The first seeds and plants of cinchona and tea cultivated in Jamaica were sent out from Kew. Numerous fibre plants, cardamoms, peppers, india-rubbers and spices have been supplied to the islands through the instrumentality of Kew and distributed by the local gardens. The records of these and similar introductions are easily accessible. There are mentioned here only for the purpose of indicating the important part which introduced plants generally have taken in establishing successful industries in the West Indies.

With the exception of pimento and some timber and dye woods, it may be generally assumed that all the industrial plants of the West Indies, as we know them at present, have been brought from other countries. Hence we realize the useful character of the duties assigned to the Botanic Gardens, specially charged with work of introducing and distributing such plants. It is only by such means that the islands can be supplied with the best sorts and kinds of plants suited to their circumstances, and they can be so equipped as to hold their own amidst the keen competition of other countries.

Botanical Gardens.

For such purely agricultural communities as exist in the West Indies, a well organized and efficient Botanical Garden is by no means a luxury. It should rather be regarded as a necessity. It may be useful to state what are the functions of such a garden. The work undertaken by it should be primarily of a scientific character. It should devote itself to the investigation of the indigenous plants of the island, and to their proper identification and classification. It should supply information respecting those possessing medicinal, economic or industrial value, and keep records of their uses. It should keep both living and dried specimens of such plants conveniently at hand for the use of those who desire to study them. When so much is done as regards the native plants, a botanical garden by means of correspondence and exchanges with kindred institutions should introduce valuable, rare and desirable plants from other countries, and cultivate them for the observation and instruction of the inhabitants. On the purely practical side, and where other means are wanting, a well organized garden should raise valuable plants by seeds and cuttings, and distribute them with cultural information for the purpose of establishing new industries.

Up to within the last ten years, the whole of the West Indian islands possessed only two Botanical establishments, one at Jamaica and the other at Trinidad. The gardens at Jamaica were established in 1774, and the records of their usefulness during more than a century, fully justifies the important place assigned to them. To apply to them the words of Bryan Edwards, they "have supplied subsistence for future generations and furnished fresh incitements to industry, new improvements in the arts (of cultivation) and new subjects in commerce." I have already alluded to the remarkable results which followed the introduction of logwood to Jamaica. It may be useful to refer to another industry practically created by the botanical gardens. In the year 1824, it was laid down as one of the objects of the Botanical Garden at Jamaica, that it should devote attention "to the investigation of many unknown native plants of the island, which from the properties of those already known, it is reasonable to infer would prove highly benefical in augmenting internal resources by supplying various articles of food, for medicine, or for manufacture . . by means of which great commercial advantages might be obtained; among others, the various vegetable dyes claim particular attention as promising a fruitful field of discovery.'"

It is interesting to note, that while no dye-woods whatever were exported from the island in 1824, a small trade of the value of £1,859 was started in 1833, which, since that time, has steadily increased, until now it has assumed relatively, large dimensions. The export of dye-woods in 1870 reached a gross value of £112,313 ("Jamaica Handbook," 1884-85, p. 375). Similar results in more recent times have attended the increased attention given to the cultivation of fruits that had been neglected in Jamaica. The export of these in 1875 amounted to £14,912, in 1884 the total value had increased to £273,534.

Results such as these, although obviously of a special character, justify the attempt now being made to improve the circumstances of the West India islands by means of the extension of botanical efforts. They afford also a striking instance of what is capable of being accomplished in these islands, when careful investigation and judicious and enterprising efforts are combined to fit local circumstances to the demands of the outer world.

The services of botanists in creating important industries have not usually received the attention they deserved. We hear a good deal of what engineers and chemists have done, but the work of botanists is apt to be overlooked. In nearly all our colonial possessions whose prosperity is based on agricultural pursuits, botanists have been the pioneers in wresting from nature some of her most jealously guarded secrets. The industries of the West, no less than the valuable tea and cinchona industries of the East, are largely indebted to botanists for their initiation and development. Few realise these services; but the results are no less striking and suggestive as regards the possibilities of the future.

Botanical Stations.

What has been done by the Botanical Gardens at Jamaica, and is being done by the excellent gardens at Trinidad and British Guiana, indicates a very important means whereby the other islands may be benefitted. The latter islands, it must be remembered, are small and comparatively isolated. Their smallness and their isolation have, indeed, been the chief operating causes in their backwardness. To assist them in developing industries suited to their circumstances, a scheme of Botanical Stations has been devised, which is now partly in operation. This scheme was first suggested in the Report of the Royal Commission of 1883. It was strongly supported by Sir Joseph Hooker, and accepted by the local legislatures with the approval of the Secretary of State for the Colonies. The scheme provided for the establishment, in each island not already supplied with a Botanical Garden, of a small and inexpensive establishment called a Botanical Station. The details of the scheme have been already fully discussed, and may be known to many here to-day. The chief points involved are the maintenance of a nursery and a depôt for plants in each island, and the diffusion by means of bulletins of practical hints as regards their treatment and cultivation. The stations would be affiliated either to the Botanical Gardens at Jamaica or Trinidad, and it would receive from these gardens seeds and plants on payment in accordance with an established schedule of prices. It may be gathered that such a scheme of botanical stations for the lesser West Indian islands, seeks to meet the special circumstances under which they are now placed, and to do so in the most flexible and economical manner. It is evident that by the adoption of such a scheme, which practically amounts to a botanical federation for purely economical purposes, these islands will be enabled to act much more thoroughly and economically, as a whole, than if each one depended entirely upon its own resources.

The Government of Jamaica has cordially given its assent to the scheme, and stations are already established at Barbados and St. Lucia, and a botanical garden at Grenada. Unfortunately, the island of St. Vincent and Tobago, which most require the services of a botanical station, are said to be too poor even to afford the cost of so moderate an outlay as is here involved. In the Leeward islands, comprising Dominica, Antigua, Montserrat, St. Kitts and Nevis, and the Virgin Islands, although the scheme was accepted by the local legislatures in 1885, it has not yet been put into force. The backward condition of Dominica, which is third in size of the British West India islands, is simply deplorable. The great part is still unopened forest. It possesses such natural resources of soil and climate, that nothing is wanting but the right application of capital and energy to make it one of the most prosperous of our tropical dependencies. Its finances are said to be so low at present as not to admit even of the simplest attempt being made to develop local industries. The Leeward islands should possess a well-organised Botanical Department similar to Jamaica and Trinidad. At present, they are completely cut off from all means of starting new industries, and the local policy which has thus isolated and crippled them, is alone responsible for their present unsatisfactory condition.

I conceive that no mission could be nobler and worthier for those interested in these islands, than to bring a prosperity to them at all proportionate to their resources of material wealth and natural beauty.

Soil and Labour.

There is practically very little land in the West Indies which is not capable of some cultivation. It should be remembered that the vast tea industry of Ceylon, now worth £800,000 annually, has been established for the most part on exhausted coffee lands. The Sisal hemp industry of Yucatan, of the annual value of nearly a million sterling, exists under such conditions of aridity and sterility of soil as are found in few of the West India islands.

There is no lack of good soil in the West Indies. It is too commonly assumed that most of the rich soil in these islands has already been under cultivation, and that it is nearly exhausted. It is true that much land once under sugar has been abandoned. But it is these lands which now support a flourishing fruit industry. The hilly lands in many of the West India islands are practically untouched. Only about one-eighth of Trinidad is occupied by cultivation. In Jamaica, in the Blue Mountain districts, there are more than 100,000 acres admirably adapted for the growth of tea, coffee, and cinchona; while further west there are 200,000 acres suited for the cultivation of oranges, cacao, spices and fibre plants. The high lands of St. Vincent, St. Lucia, and Dominica are as innocent of cultivation as they were four hundred years ago at the time of their discovery.

If good roads were opened into the interior of the islands, and railways were extended connecting the centres of production with the shipping ports, the lands available for cultivation would be sufficient to maintain a prosperity greater than anything yet seen in the West Indies. This prosperity, I feel convinced, must come sooner or later. The rush of planters eastwards has gone on so long that a reaction in favour of the western colonies may be safely predicted. The "labour question" in the West Indies is a well-threshed theme. I do not propose to reopen it. I would only mention that there is no doubt as to the rapid increase of the black population in these islands, and the labour question is thus in course of being solved by the most effectual means.

The chief care at present should be directed to prevent the rich and fertile lands in the West Indies being destroyed by the wasteful system of negro "provision grounds." This system is a relic of the times of slavery, when negroes were allowed to grow provision for their own subsistence on certain portions of the estate to which they belonged. Under the present conditions, such a system is most detrimental to the negroes themselves, as well as to the best interests of the islands. To allow the negroes to destroy acre after acre of the best woodland, even on a payment of a nominal rent is economically most disastrous. It practically amounts to an organised system of impoverishment of the soil, which in other colonies has been suppressed by strict legislative enactments. This "provision ground" cultivation has a direct bearing upon the labour supply, and it should be dealt with by the Legislature as a serious economic problem, on the solution of which the future welfare of the islands depends. If the labour of negroes, now expended in fitfully raising a few yams and cocos, was concentrated upon permanent plantations, the wealth of the islands would be enormously increased. At present the land is being systematically impoverished merely to supply the negroes with the bare means of existence. If once the negroes were taught to abandon provision ground cultivation and depend upon permanent cultivation and upon wages, the "labour question" in the West Indies generally would present no more difficulty than it does in Barbados. This island possesses an unlimited supply of negro labour. It is needless to say that it has no "provision grounds," for every acre of land is under suitable cultivation, and yields abundant crops.

Forest Reports.

An inquiry has recently been made into the condition of forest growth in the West Indies by Mr. E. D. M. Hooper, of the Indian Forest Department. The islands visited were Jamaica, Tobago, Grenada, St. Vincent, St. Lucia, and Antigua, together with the colony of British Honduras.

The reports on all these have already been issued, with the exception of Antigua, and the report on this latter is in the press. These reports have been prepared with great care, and they cannot fail to have an appreciable effect upon the treatment and management of the forests still left in the West Indies. These forests are necessary, not only as reserves of timber to supply future wants, but as also a means of maintaining due humidity of climate, and protecting the sources of springs and rivers. Mr. Hooper has dealt with the nature, extent and value of West Indian timber trees, and he has brought together a large amount of useful information respecting the condition of the interior of the islands, and the measures which are best adapted to prevent extensive and reckless cutting down of forests necessary to their well-being and future prosperity.

It is hoped that these forest reports will serve as a basis for useful legislation in the West Indies, and that all concerned will regard a rational system for the preservation of forests, and for maintaining the fertility of the soil as intimately connected with their very existence as centres of production in everything relating to plant life. Unfortunately, arrangements were not made for including Dominica, Trinidad, and British Guiana in the inquiry, and hence no reports have been prepared on the forests of these colonies.

Local Industries.

I have, so far, discussed the general conditions affecting cultivation in the West Indies, and I shall now give a brief account of the local industries.

Next to sugar the most important industry is cacao. This is the second largest industry in Trinidad, the chief industry of Grenada; while at Jamaica, St. Lucia, and Dominica, it is receiving considerable attention. I should regard cacao as essentially a West Indian industry. It is in every way suited to their circumstances as regards soil, climate, and labour supply, and the consumption of cacao is steadily increasing. Cacao has not been so successful in Ceylon as was once anticipated, and hence the West Indies should make cacao growing an industry second only to sugar. Coffee cultivation is confined chiefly to Jamaica. The high lands in Trinidad, St. Vincent, St. Lucia, and Dominica are well suited for coffee plantations, and if the produce were well cured the results would be as generally remunerative as they are with the best blue mountain coffee of Jamaica.

We have heard a great deal of fruit cultivation in Jamaica, and the important position to which it has attained within the last ten years. This industry is now of the annual value of nearly £300,000. It is capable of still further expansion if once a fruit trade were opened with Europe. Messrs. Scruttons have shown that it is possible to bring West Indian fruit to this country in excellent condition, and if satisfactory arrangements were made at this end to dispose expeditiously and remuneratively of the fruit it could be grown to almost any extent throughout the islands. I regard the growing of bananas as, after all, only a means to an end. The cultivation of this plant on the same land is distinctly limited. After a certain time even the best land becomes exhausted for this crop, but is well suited for the cultivation of cacao, coffee, spices, and cocoanuts. Wherever bananas are grown for fruit, provision should be made for permanent plantations of something else to take their place. If this is not done, and the land is allowed to lapse into "ruinate," banana-growing scarcely rises superior to the "provision growing" of the negroes. This is a subject which I have urged upon the attention of planters in Jamaica, and I believe with some effect. If all banana plantations in Jamaica, now utilised for growing fruit, were systematically established in suitable localities with cacao, the results, ten years hence, would rival the cacao industries of Trinidad and Grenada. Where cacao cannot be grown there are oranges, coffee, and spices; if these are unsuitable, no land which can grow bananas will fail, at least, to grow cocoanuts. It should never, under any circumstances, be allowed to lapse into jungle and ruinate.

The cinchona cultivation in Jamaica, which is now established over some 5,000 acres in the Blue Mountains, has latterly been discouraged by exceptionally low prices. There is, however, no reason to doubt that eventually prices will improve, and those who have persevered in maintaining the cultivation will be remunerated. If Jamaica had started to plant cinchona when India and Ceylon did, the high prices of 1880-82 would have greatly assisted Blue Moun tain industries. The quality of Jamaica cinchona is unquestionably good, and this fact should encourage planters to wait for a better market. Jamaica tea has lately been carefully tested, and pronounced to be specially suited to the London market. It possesses a fuller flavour than Chinese tea, but is not so harsh as Indian tea. Hence it is suitable for being used without mixing. If a tea industry were established in Jamaica to meet local demand, there is room for a small plantation. The import duty of one shilling per pound would more than cover the extra cost of labour, while an increase in consumption might reasonably be expected. The growth of fibre plants has been started more than once in the West Indies, and even now there is an attempt being made to establish plantations of Ramie, or China grass. I am clearly of opinion that fibre growing is still in the experimental stage. The most promising fibre industry suited to the circumstances of the West Indies is that of Sisal hemp (*Agave rigida*). Full particulars of this are given in the *Kew Bulletin* for March, 1887. A hemp industry could be successfully established in the Liguanea plains in Jamaica and some parts of Barbados and Antigua. Nothing is required but to import plants from Yucatan sufficient to establish about 500 acres, and leave them on the land for five or six years, when they would be fit for cutting. Machines have been regularly used in Yucatan, which are known to be effective in producing a marketable fibre. There is nothing speculative or uncertain about the industry. The profits are small, but so are the risks. A small labour supply is only necessary, and the soil to grow the agave plants need only be hot and poor.

Spices, such as nutmegs, cloves, and cardamoms, have been successfully established in Grenada, where also Colonel Duncan has shown what may be done with old sugar estates to render them most productive and remunerative. This island is destined to become the spice island of the west. The export of spices from Grenada in 1885 amounted to 987 cwt., of the value of £5,526. Time will not permit me to discuss many other minor industries. The cultivation of limes (for lime juice and citric acid), of annatto, tobacco, ginger, essential oils, india-rubber, medicinal plants, sarsaparilla, peppers, turmeric, aloes, and tanning substances are more or less taken up in the islands, and where the circumstances are favourable, they deserve every encouragement.

SUMMARY.

In concluding my remarks, I would point out that the want of capital is traceable everywhere in the West Indies. A few years of low prices soon cripples their industries, and there is either an abandonment of cultivation or a reduction on so large a scale that, when prices revive, they are quite unable to take advantage of them. The time has now come when the West Indies deserve a more generous and sympathetic treatment on the part of the mother country. Their credit has been lower than was deserved, and lower than the facts fully warranted. There is no reason to doubt that the cultivation of such articles in general consumption as sugar, coffee, cacao, tea, fruit, and tobacco are likely, under proper management, to prove as remunerative in the West Indies as in other tropical countries. The fashion has been to decry these islands, to speak of the "labour question" as an insuperable barrier to progress, and to spend and lend money on worthless enterprises in Central American republics, when it would have been just as well to have cast it into the sea.

The intelligent and progressive action taken in Jamaica to encourage industries, to open up the interior lands by roads and railways, to subsidize steamers for coasting purposes, and foreign trade is already bearing satisfactory results, and there is every hope that before long this island will have such a number of successful and permanent industries that its prosperity will be assured. It is a good sign that in all the important islands provision is being made to teach the principles of agriculture in elementary schools, and that industrial training is recognised as a necessary element in the education of the black population. If habits of industry are inculcated in schools, and a suitable training provided for those whose lot it is to be concerned in agricultural pursuits, there is every hope of ultimate improvement.

The West Indies are becoming more widely known, and their circumstances are much more familiar than they were some twenty or thirty years ago. It is now very clearly shown that the climate in such islands as Jamaica is most pleasant and agreeable in the hills, and the conditions of life there are well suited to men of moderate means who have to escape the rigours of the English climate. A few hundred men similar to those who have built up the industries of Ceylon would soon prove that capital and well-directed energy are alone necessary to revive the West Indies. For my part I have a strong confidence, a confidence in which I have not wavered since I knew them, that a hopeful future lies before these islands. It is within the power of many of us here to-day to help to make that future great, and to bring back something at least of the departed glory of these West Indian islands.

THE POPULATION OF QUEENSLAND, 1884.

The detailed report of the census of Queensland, taken May 1st, 1884, has just been issued, and is a document of great interest, showing, as it does, in great detail the condition of the population in every aspect. It is a folio volume of 374 pages, with 84 pages of appendices, containing numerous graphic diagrams, besides a volume of maps in which the results are noted in a striking manner.

The total population, exclusive of the aborigines, was found to be 322,853 persons (190,344 males and 132,509 females), an increase of 109,328 persons over the returns of the previous census taken in 1881. This shows an increase of 51·20 per cent., or over 10 per cent. per annum. Included in the population were 10,500 Chinese, 10,165 Polynesians, and 1,162 other aliens. The difficulty of obtaining an enumeration of the aborigines is very great, and therefore the estimate of 11,906 can only be regarded as roughly approximate.

The area of the colony, according to the latest computation, is 668,497 square miles, of which the Northern Division contains 255,406 square miles, the Central Division 223,341 square miles, and the Southern Division 189,750 square miles. The population in these divisions was as follows: Northern Division, 52,339 (0·24 per square mile); Central, 38,821 (0·17 per square mile); Southern, 221,693 (1·16 per square mile). The average density of the whole colony is only 0·478 per square mile. In the Northern Division 48·40 of the population was urban, in the Central 51·77, and in the Southern 22·53. The number of adult males capable of exercising the political franchise was 92,015, but only 50,787 (54 per cent.) of them were registered as electors, the number of members of the Legislative Assembly being 59.

As to occupations, we find the population classed as follows: Professional, 7,040; domestic (wives, widows, children, servants, &c.), 171,163; commercial, 19,790; agricultural, 55,890; industrial, 51,489; indefinite and unproductive, 11,483; persons of rank and property, 309; public burthen, 3,608; no occupation, 17,481. Of the total population, 56,685 were receiving education, there being only 1,744 children over five years of age not at school. Of males (excluding alien races) between 16 and 50 years of age, 56,899 were bachelors or widowers, and 29,593 women between these ages spinsters or widows. As to ages, 152,052 were between 1 and 21 years of age, 66,349 from 21 to 30, and 93,057 between 30 and 60, so that the great bulk of the population are in the vigour of life.

SACCHARINE.

ITS USE FROM A MEDICAL POINT OF VIEW.

The steadily increasing employment of this article in medicine, and its probable eventual use by confectioners have attracted the attention of the French physicians. At a sitting of the Académie de Médicine of Paris the subject was discussed with the following results, which we condense from an article in the *Journal des Fabricants de Sucre*:—

Certain physicians have asserted that the use of a dose of one-tenth of a grain daily by diabetic patients produced no inconvenience, but the contrary was asserted by others, and the question remained unsettled. Dr. Worms, who read a paper before the Académie, found that in the case of four diabetic persons, to whom he administered the above dose, only one felt no inconvenience during a period of two months, the other three suffered from disorder of the digestion, which compelled them to give it up after a fortnight's trial, and one of them, on attempting to recommence the use of the saccharine, again experienced the same symptoms. The first desideratum being to keep up the digestive powers, it would have been very imprudent to continue the use of the saccharine, which would thus appear to be likely to produce bad effects, if its use should become general. M. Dujardin-Beaumetz agreed with Dr. Worms that the facts, which he had not remarked himself, but which none the less exist, however they may be explained, constitute a question of some gravity, and that, whether considered from the point of public health, or of the Treasury, or in connection with the national industry of sugar manufacture, the attention of the authorities should be drawn to it. Dr. Worms inclines to think that saccharine is indigestible and disturbing to the digestion. Sugar is a food, saccharine is not. It is the confectioners who are the most interested in this product which would enable them to do away with sugar in their manufactures, as they have already dispensed with fruits. It would not be the least marvellous among the food adulterations of the age if we were to have preserves and similar articles which contained neither sugar nor fruit. On the eastern side of France a compound is said to be now sold under the name of Sucre de Cologne at 25 centimes (2½d.) the pound, the nature of which appears doubtful, but which has great sweetening power, and is of a yellowish colour.

ANTI-BOUNTY CONFERENCE OF DELEGATES FROM THE ORGANIZED TRADES OF THE UNITED KINGDOM.

We have before us a full report of the proceedings of this Conference, which took place at the Westminster Palace Hotel, London, on March 22nd last. Mr. Thomas Burt, M.P., occupied the chair, supported by Mr. Charles Fenwick, M.P., and Mr. William Crawford, M.P.

The Conference was convened by issuing the following circular:—

London Trades' Council,
East Temple Chambers,
2, Whitefriars Street, London, E.C.,
February 17th, 1888.

Dear Sir,—A recent Delegate Meeting of the London Trades' Societies connected with our Council, authorised me to make a communication to your association in reference to Foreign State Bounties.

You will, doubtless, recollect that a large and representative deputation from the organised trades of the Kingdom waited upon the Prime Minister on the 22nd of last July, to urge upon the Government the policy of convening an International Conference, with the view of adopting some mutual agreement to terminate these bounties, and, acting upon the suggestions of the Trades' Deputation, the British Government issued invitations, which were accepted by all the bounty-giving countries of the world. The delegates representing the various nations carried on their deliberations in the British Foreign Office, ultimately agreeing upon and unanimously signing a Protocol with a form of convention for bringing about the abolition of these State bounties, which they declared ought to be done. Copies of this Protocol, and proposed form of convention, are forwarded herewith, and also copies of Mr. Gladstone's latest letter, as well as the statement made by our Executive to the British delegates to the International Conference.

The delegates of the various nations are now consulting their respective Governments with the intention of re-assembling in London in April next, armed with full powers to give legal effect to the proposed convention. It is, therefore, of the utmost importance that the organised trades of the Kingdom should express their determination that State bounties shall cease, especially as this course has now the unanimous approval of all the European nations affected; therefore, such Bounties ought to speedily become things of the past.

As, however, this movement for abolishing State Bounties has been purposely misrepresented and made to appear a part of what is termed the Fair Trade agitation, it is most desirable that the vast difference between the two questions should be made clear and distinct once and for all. In the words of Mr. Gladstone, State bounties are a part of the system of Protection, therefore, in the interest of genuine Free Trade, it is our duty as Free Traders to justly demand the termination of these bounties. Whereas, on the other hand, Fair Trade, however disguised, means nothing more or less than a return to the system of fiscal Protection. To the mischievous doctrine of Fair Trade or its practical institution, which is being promulgated in certain quarters, we are most strongly opposed, and in order to give effect to our opposition, we trust that we shall, as on former occasions, be honoured with your support. Our object in writing now is to cordially invite your association to appoint, on an early date, a delegate to attend about the middle of March next a Free Trade Conference in London, which bids fair to be thoroughly representative of the trades of the United Kingdom. Mr. T. Burt, M.P., will preside, and will be supported by Mr. H. Broadhurst, M.P., Mr. C. Fenwick, M.P., Mr. W. Crawford, M.P., with other Members of Parliament.

In order that the scope and action of this Conference shall be definite, and that your Society shall not be pledged to anything in the dark, we forward copies of three resolutions, which, as an instruction to your delegate, we respectfully invite you to adopt. Beyond these resolutions the Conference will not go. When your delegate is elected, kindly send me his name and address at once, and we will forward him forthwith the date, time, and place of meeting, with all other necessary information.

On behalf of the Trades' Council,
I am, yours faithfully,
GEORGE SHIPTON, Secretary.

The three resolutions mentioned in the above, and to which the proceedings were strictly confined, are as follows:—

I. "That this Conference of Delegates from Trade Organizations throughout the United Kingdom declares its unshaken belief in the policy of Free Trade expounded by the late Richard Cobden, and is of opinion that a return to the system of fiscal protection, in any form, would endanger the peace of the country, imperil the interests of our trading community, and be injurious to our industrial population."

II. "That inasmuch as State bounties given by foreign Governments to their industries, to enable them to unfairly compete against other industries on British markets, are a violation of, and an attack upon Free Trade principles, are ruinous in their effect upon honest industry, and force the community to rely upon artificial instead of the unrestricted natural sources of supply, this Conference calls upon the Government to adopt such measures as may be necessary to bring about the abolition of foreign State bounties, thereby restoring Free Trade in the markets of the United Kingdom."

III. "That this Conference declares that, while the working classes demand no artificial fiscal advantages for British industries, neither will they tolerate the operation of artificial subsidies to foreign industries, and they insist that competition upon British markets shall be upon natural conditions for all."

The first resolution was moved by Mr. Slatter, of Manchester, and seconded by Mr. Wilson, of Durham. It was supported by Mr. Tait, of Glasgow, and Mr. Fenwick, M.P., who spoke, he said, as an out-and-out free trader, and was unanimously carried.

The second resolution was moved by Mr. Mawdsley, of Manchester, and seconded by Mr. Granger, of Birmingham, and supported by Mr. Matkin, of Liverpool. and by Mr. Johnston, of Aberdeen. In the course of the discussion upon the second resolution, Mr. Powell, of London, protested against the policy of countervailing duties, and concluded by moving an amendment to that effect, which, however, was not seconded. The chairman ruled Mr. Powell's proposition to be out of order as an amendment, and as a substantive motion it could not be entertained, inasmuch, as the subject had not been submitted to the societies represented at the Conference. The resolution was ultimately and unanimously passed with the addition of the words "consistent with the principles enunciated in the foregoing resolution" after the words "calls upon the Government to adopt such measures," which was proposed by Mr. Maddison, of Hull.

The third and last resolution was proposed by Mr. Uttley, of Sheffield, and seconded by Mr. Swift, of Manchester, and supported by Mr. Ritchie, of Dundee, Mr. Knight, of Newcastle, Mr. Bloor, of Birmingham. Mr. Judge, a delegate from Leeds, in speaking to this resolution, alluded to the argument which had been used against them, that whilst our refiners had been injured by bounties, and as a consequence, less machinery and fewer workpeople were employed by them, other industries, such as the manufacture of preserves, has greatly increased, so that the amount of machinery, and the number of workpeople now engaged in the sugar industries of this country, were greater than ever. He (Mr. Judge) did not say this was true, but if these arguments were not valid ones, it was for the conference to confute them.

Mr. Shipton replied to Mr. Judge as follows:—

I can assure Mr. Judge that we want to make the case clear. I know the allegations that have been made with regard to the actual increase in the demand for sugar in other industries—I mean such as the jam and the biscuit making trades. Now, it is all humbug, and I shall settle it in about two minutes. The amount of sugar consumed in 1877 in this country—that is through the whole of the kingdom—was 900,000 tons. Ten years later the total consumption for every purpose, notwithstanding the increase of population for ten years, was only 1,125,000 tons. Now, where is all this alleged expansion of trade? You have hardly kept pace, considering the population, in the consumption of sugar. What comes of this enormous jam trade and biscuit trade that absorbs the men who are thrown out from the engineering shops and charcoal making trades, with many other industries which are suffering the loss of their trade through foreign State bounties? There is nothing in it; and if you really take the trouble to ascertain the facts that bear upon this subject—you can get them from the Board of Trade returns—they will dispose of such small talk in this matter. I give you the figures, and you can judge of the facts. The consumption of sugar last year and the year before was not so great as it was in 1885. In 1885 the annual consumption per head of the entire population in this country was 70·22 pounds. We have gone down to 65, as Mr. Judge said. Where is the expansion? Does not that prove that the purchasing power must be less? I just mention this to meet the suggestion of Mr. Judge about the railway. We do not want this resolution to be misunderstood, that because a railway runs goods a little cheaper abroad and brings the corn down to the sea-shore, and our ships bring the things here, that we want to deal with that as a State-paid bounty question. It may be a disadvantage that railways should be conducted in this strike-under-the-belt fashion, but our aim is not to meet that question at all. It is the State paying from the taxes of the people out of the exchequer a profit to the manufacturers to enable them to compete at an advantage to our open market. That is what we want to meet. If we take out of the resolution the words "artificial subsidies," and insert two other words, "export bounties," it would read "that this Conference declares that while the working classes demand no artificial fiscal advantage for British industries, neither will they tolerate the operation of export bounties." That will meet the case that Mr. Judge suggests.

The resolution, as amended by Mr. Shipton, was carried unanimously.

After the usual vote of thanks to the chairman, the Conference terminated.

SORGHUM FOR IOWA.

Muscatine, Iowa, April 8th, 1888.

To the Editor of the "Sugar Cane."

Sir,—In reading the *Chicago Journal of Commerce*, I see there is a good deal of enquiry amongst English capitalists as to the manufacture of sugar from the Sorghum, and beet, in the United States, and as it would be of interest to some of your readers to be well posted as to the most favourable locations, I take the liberty of calling the attention of some of the capitalists, who intend to embark in this enterprise to this locality—Muscatine is situated on the Mississippi river, 30 miles below Rock Island. The latitude is about the same as the Rio Grand experimental station in New Jersey. Immediately adjoining the city is an island or streak of rich sandy alluvial soil, formed by the river that stretches for near 20 miles, and averages 6 miles in width. This island is noted all over the West for its production of sweet potatoes, and water melons that are remarkable for their superior sweetness, and are shipped all over the West, large shipments being made to Chicago. Sorghum has been raised on this land for over 25 years, but was only made into an inferior article of molasses by the parties raising it. Land can be had at a low figure, water is found in abundance, fuel cheap and plentiful, coal $2 per ton, slack at $1·00 a ton, limestone or lime at hand, and ample transportation by either rail or water. As it is only a question of time when water communication will be opened from the lakes to the Mississippi as Congup is considering the matter at the present time, the means of communication by water either North or South will be ample. Another point, we have never been visited by the locusts, or as they call them here the grass hoppers, that have frequently devastated the crops in Kansas and Nebraska. Experts have declared our black and clay soil all that can be desired for raising the sugar beet. Our citizens here are very sanguine of success in the cultivation of sugar, and will give all the encouragement desired to capitalists investing in this enterprise, and further information desired can be obtained by addressing your correspondent,

Samuel Sinnett.

Dear Sir,

I have resided in Muscatine now for a year and a half, and believe the above statements accurately to represent the facts. My friend Mr. Sinnet is a substantial landed proprietor in the neighbourhood.

Yours faithfully,

Rev. E. C. Paget, M.A., Oxen,
Rector of Trinity Episcopal Church, and a
Clergyman of the English Church.

I endorse the above.

J. M. Cobble, Mayor.

THE SUGAR QUESTION.

Glucose or Sugar, Which will You Have?

From the *Muscatine News* (Iowa), February 29th, 1888.

Adulteration is the order of the day, and few are aware of the extent to which the great staple, sugar, is incorporated with foreign substances to deceive and cheat the consumer. When sugar used to be mixed with sand the cheat was easily discovered, but when glucose is incorporated with it in the clarifying and manufacture, it takes a chemist to detect the cheat. Now it must be borne in mind that you never hear of the sale of glucose under that name, nor you never see quotations of it in the market reports. It is estimated that the population of Iowa is something in the neighbourhood of 2,000,000, and as it is stated that 56lbs. of sugar is consumed per capita, it will require $11,200,000 worth of sugar to supply the State, and the purchase money for this all goes out of the pockets of our citizens to enrich a lot of piratical manufacturers, who counterfeit and adulterate the article they put on the market, and through trusts combinations exact a tribute that it astonishes the calm thinker that the people will submit to it for a single day. But the question comes up, how are we to avoid this wholesale plunder on the article of such general consumption?

RAISE YOUR OWN SUGAR.

Can this be done in Iowa? Yes, if you have the energy and perseverance that you have manifested in a hundred other enterprises. But talk won't do; action is required; and the fostering care of the State should be loudly demanded. It will require at least fifty factories of a capacity of turning out 2,000,000lbs. per year each, to supply our State. Then there will be no limit to the demand, for the consumption outside of the State will be simply enormous, and the demand is increasing year by year. The production of sugar in Germany increased from 4,000,000,000lbs. in 1882 to 5,600,000,000lbs. in 1885, and this sugar (beetroot) was sold at the factory at 2 cents per lb., and the Government paid a bounty on every ton exported, a large portion of which came to this country. That is the kind of protection that pays—to foster this enterprising manufacture. But how are our citizens protected? Why, the Government exacts a tax of 2 cents per lb. on all sugar imported, which the manufacturer adds to the price of the article; then the sugar trust (that crew of pirates) adds another 2 cents for their own profit; and after adulterating the article, no one knows how much, it is sold to the retailer, who receives the article in barrels, but leaves him no chance of mixing foreign substances, as that is a reserved right of the sugar trust. And all this extortion and robbery is forced on the general citizen on an article that can be raised in our own State, and sold in its purity for from 3 to 4 cents per pound. The manufacture of sugar, provided it can be made a success, is far more important to the citizens of Iowa than the building of 1000 miles more of rail roads. If this subject was properly presented to the legislature there would be no doubt of a bounty law being passed sufficient to secure a fair trial for this important industry. Were there no sugar manufactured there would be no bounty paid. By all means let the Business Men's Association call a meeting, inviting all the farmers and citizens interested in this vital question, and prepare petitions to the legislature, and, if necessary, send some live, energetic man to Des Moines to properly lay the question before that body and the Governor, and not only present the petitions, but urge their being granted.

Yours, for prompt action,

Muscatine, Iowa. SAMUEL SINNETT.

LIVERPOOL WORKMAN'S ANTI-SUGAR BOUNTIES ASSOCIATION.

A meeting of the above Association was held on the 23rd ultimo, in the Concert Hall, Lord Nelson Street, for the purpose of passing a resolution to call upon the Government to prohibit the importation of sugar into this country from any foreign country refusing to abolish the bounty. Mr. P. Harris presided, and there were also present on the platform Councillor Taggart, Messrs. C. J. Crosfield, A. Dunlop, T. Evans, James Farrie, James Farrie, jun., E. T. Griffiths, George Jager, jun., James Leitch, Gustaf S. Sommer, and T. O. Easton. There was a large attendance.

The CHAIRMAN, in opening the proceedings, said that they had met there to pass a resolution condemning the bounty system. That resolution they proposed should be very strong and decisive. As they were no doubt aware, an international conference was now sitting in London upon the vexed question of the sugar bounties. Those in the sugar trade of Liverpool had for a considerable length of time been in a state of uneasiness and suspense. They did not know how soon their refineries would be closed, as a number of them were at the present time throughout the country. He had visited most of the towns in England, and it had never come to his knowledge yet that when one working man asked another working man for support it was refused. They might depend upon it that if an injustice was being perpetrated, if an outrage was being made on free trade principles in this country, the end would come sooner or later. This was not a new question, as it had been agitated for years, and every Ministry, one after another, had taken the matter into serious consideration. Lord Salisbury had said that it was an outrage on free trade principles, and Mr. Gladstone said it was foolish and unjust, but until the present time the thing had not been seriously grappled with. He repudiated with indignation any statement that the working classes of this country required sugar below its natural free trade price.

Mr. D. SHIELD then proposed the following resolution:—

"That, inasmuch as the State bounties given by foreign Governments to their industries, to enable them to compete against unsubsidised industries on British markets, are ruinous in their effect upon honest industry, and force the community to rely on artificial instead of the unrestricted natural sources of supply, this meeting calls upon the Government, in case of any hitch arising which might endanger the success of the Sugar Bounties Conference, to propose such measures, either by countervailing the bounties or by prohibition of import, as may overcome any obstruction of the negotiations, and may lead to the restoration of free trade in sugar."

In doing so he said that they proposed to send the resolution to the Conference now sitting in London. They took credit to themselves that this Association had done some good in forwarding the movement. The Trades Council of Liverpool took them by the hand and assisted them to organise their meetings, and he believed there was not a town in all Britain from which such resolutions had not been sent by trade organisations to the Government.

Mr. John Black, in seconding the resolution, said that he was sure they had right and justice on their side, and if they did not pass the resolution they would be doing themselves a great injustice.

In supporting the resolution, Mr. Thomas Evans said that there was no doubt about the fact that there was a grievance existing in the sugar trade. The very fact of a conference of men from all parts of Europe sitting in London was sufficient to prove this. Nothing but a most important matter would call together such an international conference. He hoped it would end in the total abolition of bounties throughout the whole of Europe.

Several other gentlemen also addressed the meeting in support of the resolution, which, on being put to the meeting, was carried with acclamation. A resolution was also carried that copies of the resolution should be immediately wired to the Marquis of Salisbury and Baron H. de Worms. A vote of thanks to the chairman concluded the proceedings.

TOTAL DESTRUCTION BY FIRE OF MESSRS. COWAN'S SUGAR REFINERY, AT BARNES, LONDON.

On April 16th, a destructive fire occurred at the Soap and Sugar Refining Works of Colonel Cowan, at Barnes. The buildings cover about ten acres of ground, and employ about 1,000 men in the manufacture of soap and the refining of sugar, and it was in the buildings devoted to the latter industry that flames broke out. The fire quickly spread, and the firemen, who arrived from all quarters, applied their first efforts to saving the adjoining buildings, for it was seen that the sugar works were beyond help. In this they were successful, but the sugar works were totally destroyed. The floors fell in one by one with a crash, and the five red-hot copper vacuum pans, each weighing thirty tons, were twisted into the most extraordinary shapes. The melted sugar ran all over the floors of the building, and was still alight when the woodwork had burnt itself out. The loss is estimated at £60,000. The reflection from the fire was seen for several miles. Owing to the vicinity of the river, great assistance was rendered by the floating barges of the Fire Brigade, and a quantity of water was poured in by the other engines, about ten of which were engaged. There were 300 men employed in the sugar works. The cause of the outbreak is unknown. There was no fire used in this part of the building, all the engines being in another part of the premises.

We understand that Messrs. Cowan have arranged to work the refinery in Whitechapel, until very recently in the occupation of Mr. Dakin, and that they will commence operations forthwith,—the capacity of output, however, will only be about one-half of that of their late works at Barnes.

DIFFUSION EXPERIMENTS AT FORT SCOTT (KANSAS), RIO GRANDE (NEW JERSEY), AND LAWRENCE (LOUISIANA).

We have recently received bulletin, No. 17, of the United States Department of Agriculture, Division of Chemistry.

From the introductory letter from Mr. Wiley, our readers will see the general scope of these reports, as well as Mr. Wiley's own opinion of the results obtained:—

United States Department of Agriculture,
Washington, D.C., January 26, 1888.

Sir,—Complying with your instructions I beg to submit herewith for your approval Bulletin No. 17 of the Division of Chemistry, containing a record of the experiments made by your direction in the manufacture of sugar from sorghum and sugar canes.

The bulletin is divided into three parts, viz.:

Part I, *experiments with sorghum at Fort Scott.*—Containing the report of M. Swenson; drawings and description of apparatus; a digest of the report of E. B. Cowgill to the State Board of Agriculture at Topeka, Kans.; and a statement of the action taken by the Department in respect of certain letters patent granted to M. Swenson for the use of lime carbonates in the cells of the battery.

Part II, *experiments at Rio Grande.*—Containing the report of H. A. Hughes, drawings and descriptions of apparatus used, and analytical notes.

Part III, *experiments in Louisiana.*—Containing the report of H. W. Wiley of the results of the experiments conducted at Lawrence, La.

In obedience to your further orders, I took charge of the chemical work of the three stations. During the summer of 1887 the necessary apparatus and chemicals were purchased and sent to the several stations. Of my assistants, C. A. Crampton and N. G. Fake were directed to take charge of the analytical work at Fort Scott, and were furnished with written instructions for their guidance in taking samples and the general method of analyses to be followed.

F. V. Broadbent and H. Edson were sent to Rio Grande. They had the same instructions as were given my assistants at Fort Scott. In addition to this I personally directed the beginning of their work. On October 14, 1887, Mr. Broadbent resigned his position in the Department for the purpose of pursuing his studies abroad. Mr. Edson from that date had sole charge of the analytical work until the end of the season.

On April 2, 1887, G. L. Spencer was sent to Fort Scott to secure the removal of certain machinery to Lawrence and joined Mr. Barthelemy in the work of preparation at that station.

At the close of the work at Fort Scott, Dr. Crampton and Mr. Fake also came to Lawrence to assist in the chemical work at that place.

In the following pages only such chemical data are given as are necessary to illustrate the experiments made. Much of the chemical work is yet undone, and it would delay too long the publishing of this bulletin to wait for its completion. All the details of the chemical work for all three stations will therefore be collected and published in a separate bulletin, viz., No. 18. The success of the work at all three stations has been most gratifying, and the diffusion process for the manufacturers of sugar has been advanced beyond the experimental stage by the labours of this Department, beginning in 1883, and it is now offered to the sugar-growers of the country with the confident assurance that it is the best, most simple, and most economical method of extracting sugar both from sorghum and sugar canes.

Respectfully,

H. W. Wiley, Chemist.

Hon. Norman J. Colman, Commissioner.

The reports are much too lengthy for us to do more than give the conclusions arrived at. Mr. M. Swenson, who had charge of the Fort Scott experiments, says:—

"There seems to be no doubt but that there is here developed an industry of vast importance to our State and nation. For the year ending June 30, 1886, there was consumed in the United States foreign grown and manufactured sugar amounting to 2,689,881,765 pounds.* If two thousand new sugar factories were at once erected, and each should produce an annual product of one and a quarter million pounds of sugar, they would not supply the place of the sugars now imported.

The annual consumption of sugar per capita in the United States is about 56 pounds. The population of Kansas may be taken as

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* Address of Dr. H. W. Wiley before the Chemical Society, December 9th, 1886.

1,500,000. These people consume each year 56 × 1,500,000 = 84,000,000 pounds of sugar. It will be safe to say that the annual average product of the factories will not exceed 1,500,000 pounds, so that fifty-six factories will be required to supply the sugar consumed by the present population of Kansas, and for which they pay over $5,000,000 annually.

Processes whereby sugar can be made at a profit from sorghum have been worked out. These are far from perfect, but present developments give promise of others in the near future, and will enable us to produce our own sugar on our soil, with the labour of our people. Those who invest in the new industry will be cautious about experimenting with unknown conditions. Kansas is therefore likely to lead in the development, and become the first Northern sugar State."

Mr. H. A. Hughes, in his report of the experiments at Rio Grande, states in conclusion:—

"In making the above statements I wish it to be distinctly understood that neither time nor expense was spared in order to make these records accurate; the house being frequently delayed in order that the records might be secured.

I believe that a ton of field cane is too uncertain a factor to be used as a standard for calculation, as it varies considerably in wet and dry weather. Wagons containing 3,000 pounds of cane, as it comes from the field, will increase to 3,400 pounds and more by being rained on. There is a variation in the weight of the cane before and after frost; also in the percentage of leaves of the large and small canes. For these reasons it is better to use clean chips prepared for the battery on an acre of ground.

It might be worth while to state that this sugar house, with slight alteration, could be made to work 25 tons per day, having frequently worked at this rate from six to eight hours.

Believing that sorghum-sugar manufacture is to be an established industry and that reports of this nature will have an attraction for the general public, I have written in this simple style and tried to avoid technicalities. Those who wish the details I refer to the reports of your chemists, Messrs. Broadbent and Edson, who, I believe, have faithfully recorded the workings of the house; also to the report of the experimental station of New Jersey, soon to be issued."

FRENCH AND OTHER CRYSTALLISED SUGARS IN THE ENGLISH MARKET.

From the *Journal des Fabricants de Sucre.*

We have received a fresh sample of the crystallised sugars, the arrival of which, in the English market, we lately announced. This second sample is coarser in the grain than the former, but the quality is very good. It is true that the quantity of these sugars sent over is up to now, insignificant; but the fact which it is important for us to know is that the Cuban sugar can compete with the white crushed beet sugars, and that the manufacture of cane sugar is advancing in the direction of progress. The Cuban crystals, which we have before us, are quoted at 17s. 9d. in warehouse at London, that is 17s. 3d. without the cost of freight and insurance, which is equal to 16s. 10½d. f.o.b. in Tréport.

France, therefore, which up to now stood alone in manufacturing white crushed sugar fit for consumption, is now meeting, on all sides, sugars which rival her own production, not only as regards appearance, purity, and sweetness, but also cheapness. The competition which is successfully carried on by the produce of the beet, viz., Russian crystallised, German and Austrian granulated, threatens to extend to the produce of the cane, and already we see in the English market Cuban and Brazilian crystallised, indicating that the colonial planters are making serious efforts. Shall we permit these products to invade a market of more than a million tons situated at our very gates? Shall we leave to Germany, Austria, Russia, Cuba, 37½ millions of consumers? We must take precautions against this danger, and act at once with energy. The gravity of the evil may be estimated by the magnitude of the shipments of marketable sugar which our continental competitors alone made to England in the course of last year. The imports of these sugars from Germany, Austria, and Holland into the United Kingdom takes place to a large extent through such ports as Hull, Goole, Leith, Dundee, Aberdeen, &c. These imports do not figure in the statistics of the Board of Trade, which only deal with the four principal ports. Now the quantity of these sugars brought in through the smaller ports in 1887, is calculated at not less than 200,000 tons. Hull and Goole alone are said to have received nearly a third of that quantity. Are we not right in saying that the situation is serious, and that we must at once look to this competition and the means of preventing it? These means are in our own hands, we must produce at the factory sugars of good quality, corresponding in grain, colour, and taste, to the type sought for by the English consumer; in a word, sugars identical with those of Germany and

Russia. We possess the necessary improved plant, we are not short of the right quality of raw material, nor of technical knowledge; our idea is, that it is the commercial spirit which is half asleep, hesitating to rise to the level of circumstances. Let us find means to awaken it, and once more assume the position we formerly occupied.

THE GOVERNMENT PROHIBIT THE USE OF SACCHARINE FOR BREWING PURPOSES.

House of Commons, April 27th, 1888.

The House went into Committee on the Customs and Inland Revenue Bill.

On Clause 5, which empowers the Treasury to prohibit the use of certain substances in excisable goods,

Sir L. Playfair moved to insert the following words, "When it is noxious and detrimental, and to regulate its use when it acts in restraint of revenue." The object of the Amendment was to permit the use of saccharine, which would form a valuable antiseptic in beer, and would take the place of malt, sugar, and other ingredients. The reason that the Revenue objected to it was, not that it sweetened and preserved beer, but that it had a very strange effect upon the palate, making light beer taste like strong beer (laughter). The result would be that people would drink light beer flavoured with it, and until they found that they did not get drunk (laughter) would think that they were drinking strong beer, and the Revenue would lose the increased duty paid by strong beer. But he would suggest that the Revenue should have the power to tax saccharine as a fining substance, to which he understood the brewers would have no objection. *Foreign brewers used it in the manufacture of their beer, and by this clause our brewers would be placed in a very disadvantageous position.*

The Chancellor of the Exchequer said that he had no information to the effect that brewers were generally desirous of using saccharine. He admitted that its prohibition was a serious question, but if it were used in beer the loss to the Revenue would be no less than one million sterling. The introduction of saccharine into beer would not make the beer less or more strong, but it would produce upon the palate the impression that the beer was something different to what it was. The beer drinker would think that he was receiving beer that contained life-giving and life-preserving qualities, whereas it would have no such nutritious properties. In this way a fraud would be played upon the beer drinker. In measuring beer the duty was determined by the gravity, and as this substance added nothing to the quality of the beer the instruments would not take it into account, so that the total amount of duty would be less than sugar, or malt, or other substance that it replaced. He understood that so marvellous was its sweetening power that twelve ton would suffice for the whole brewing interest of the country, and that the very smallest quantity would suffice to deceive the palate of every beer drinker. More than that, there was a patent limiting the right for its production for the next ten or twelve years, so that there would be no immediate general competitive industry. The Inland Revenue did not see their way to allow its use in the brewing industry of the country. He was prepared to amend the Clause by inserting the words "or being a chemical, or artificial extract or product which may prejudicially affect the interests of the revenue." It was not at present the intention of the Inland Revenue to allow saccharine to be used. He would also be willing to insert words which would enable the Government to withdraw the prohibition at a future time if they thought fit.

Sir L. PLAYFAIR asked if the right hon. gentleman intended to deal with imported beer?

The CHANCELLOR OF THE EXCHEQUER said that was an important question, and one requiring serious consideration. *If the brewers in England had not the advantage of using this substance, that advantage ought not to be enjoyed by foreigners whose beers were imported into this country.*

Sir H. ROSCOE regretted the decision at which the Inland Revenue had arrived on this subject, because if the substance were prohibited it would be used under the rose. In order to get rid of the Revenue difficulty, he believed that means could be found by which the substance referred to could be fairly dealt with in the interests of all parties.

Mr. GLADSTONE sympathised with the Chancellor of the Exchequer in the difficult position in which he was placed, and recognised that the question was one in which the interests of the Revenue were involved on the one side, while on the other were involved real improvements in the trade. If the Government took prohibitory power against the British brewer, it seemed to him absolutely necessary that, to use the words of the noble Lord opposite (Lord R. Churchill), the principle of "simultaneity" should be adopted, and that they should at the same time take powers to check the introduction of the substance objected to from abroad. He also wished to ask the Chancellor of the Exchequer whether, before the House was called upon finally to sanction this measure for the prohibition of the use of a substance in itself undoubtedly harmless, and having economical recommendations, he would undertake that the Inland Revenue authorities would do their best to ascertain whether, on due examination, it would not be possible so to arrange that that prohibition should only be resorted to when no other alternative was open.

The CHANCELLOR OF THE EXCHEQUER said the Government were bound to consider the matter exclusively from an Inland Revenue point of view. As to foreign importations, he was officially informed that saccharine could be detected. He did not, however, wish to raise the impression that there would be an absolute *non possumus* on the part of the Government.

After some further discussion,

The CHANCELLOR OF THE EXCHEQUER said the question had nothing to do with temperance, as saccharine did not at all effect the alcoholic strength of beer, but merely increased its body. No doubt many people would be pleased if brewers were compelled to state the nature of the ingredients from which they brewed their beer, and if there was any great pressure on the Government to effect that object he did not know that the Government would offer any opposition. It was, however, not the duty of the Government to proceed in that direction. Under this Clause it would be in the power of the Inland Revenue to deal with any noxious substances. He was quite prepared to admit that scientific experiments should be made, but not in any brewer's laboratory or for trade purposes.

Sir L. PLAYFAIR said as the differences between the Chancellor of the Exchequer and himself were so great he must press his Amendment to a division. He desired to see a new industry carried on in England, and was for regulation as against prohibition.

The CHANCELLOR OF THE EXCHEQUER could not accept that issue. His proposal was to prohibit until experiments might be made and facts obtained upon which regulations might be framed. He had no wish to crush a rising industry.

Sir L. PLAYFAIR said that he and the brewers of London would be content if allowed to make experiments in their own breweries, and under the supervision of the Excise. Other experiments would be of little or no use.

The Amendment having been amended as proposed by the Chancellor of the Exchequer.

The CHANCELLOR OF THE EXCHEQUER, wishing to avoid a division that would be misleading, said that he would be glad to permit scientific experiments in breweries under proper supervision.

Sir L. PLAYFAIR declined to accept the compromise.

The Committee divided—

For the Amendment	122
Against	229
Majority against	107

[illegible]e Amendment was accordingly rejected, and Clause 5 was passed.

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., F.C.S., M.I.M.E., Patent Agent, 6, Lord Street, Liverpool; 6, Bank Street, Manchester; and 323, High Holborn, London.

ENGLISH.

APPLICATIONS.

4178. W. T. CROOKE, London, E. *Improvements in pockets or bags employed in the manufacture of sugar and like substances, together with an improved process for cleansing the same.* 19th March, 1888.

4209. A. CHAPMAN, of the firm of Fawcett, Preston, & Co., London. *Improvements in sugar cane mills.* 19th March, 1888.

4893. H. V. R. READ, London, W.C. *Improvements in sugar cane mills.* 31st March, 1888.

5017. J. Mc. C. PATON, Manchester. (Communicated by W. A. Van Dyk and Samuel Wilkinson, Java.) *Manufacturing gas for heating and illuminating purposes from molasses and other saccharine substances.* 4th April, 1888.

AMERICAN.

ABRIDGMENT.

380555. G. N. DOWNS, Chicago, Ill. *Centrifugal machine.* April 3rd, 1888. In this centrifugal machine, the central drum shaft is supported in a footstep in such a manner as to admit of a certain amount of inclination in the said shaft. The footstep bearing has a spherical enlargement, about which it can oscillate in its support. Rigid arms extend outwards from the bottom of the bearing, and spring connections at their outer ends unite them with the machine framing. The rim of the driving pulley extends downwards, and encloses the top of the footstep. Special devices are provided for oiling the bearing, and also for minimising the damage in case of the breakage of a part.

GERMAN.

38401. (Patent of addition to No. 32014, dated October 25th, 1884.) W. GREINER, Berlin. *Improvement in apparatus for the condensation of vapours.* 31st March, 1886. This patent of addition relates to the application of the device described in the principal patent f covering the valves of condenser pumps with cold water to horizo wet air pumps. The ends of the section pipe are provided rectangular openings provided with cylindrical flap valves and surrounded by a bowl which is fed with cold water through a special pipe, so that the above valves are constantly covered with water. The delivery disc valve round the suction pipe is owing to the arrangement of the outlet, always under water. The action of the valves is the same as in other pumps.

40096. Jules Malliar and Malliar Lamblot, Merbes le Château. *Immersion osmose or dialysis battery for removing salts from molasses or syrup.* 12th September, 1886. A row of cylinders of wire netting, covered with osmose parchment paper, are hung on a rod in a vessel containing molasses heated to 40°C. These are filled up with water likewise at 40°C., by means of hoses attached to a common water pipe, and left to themselves for 12 hours. After this time has elapsed, the salts of the molasses and a little sugar have diffused, and the osmose water is removed from the cylinders by means of a suction pipe. They are then filled with fresh water, submitted again to the osmose process, and so forth until the desired purity of the molasses is obtained. According to the inventors, who do not give any analytical data, this repeated osmose process removes more completely the salts from molasses than the general process of continuous working osmose apparatus.

40421. Sangerhauser Actien, Maschinenfabrik, and Eisengiesserei, formerly Hornung and Rabe, of Sangenhauser, and F. J. Weiss, of Basle, Switzerland. *Improved multiple vacuum apparatus with automatic production and maintenance of a determined pressure or boiling temperature in each of the vacuum pans.* 26th November, 1886. The lower parts of the heating apparatus of the separate evaporating pans are connected by means of branch pipes to a stand pipe, which opens at its lower end in water, whilst its upper part is connected with a condenser. The heights of the water in the connecting pipes above the lower water level can be regulated by means of chain gearing.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

January 1st to March 31st, 1887-1888.

Board of Trade Returns.

IMPORTS.

Raw Sugars.	Quantities.		Value.	
	1887.	1888.	1887.	1888.
	Cwts.	Cwts.	£	£
Germany	1,709,340	554,536	921,046	413,326
Holland	76,473	56,654	42,460	38,995
Belgium	337,025	280,396	171,594	187,487
France	1,552	1,179	938	1,149
British West Indies & Guiana	731,284	587,056	544,838	508,235
British East Indies	66,021	130,965	29,105	66,387
China and Hong Kong	12	....	6	....
Mauritius	22,077	57,061	10,120	39,294
Spanish West India Islands	....	156,044	....	125,086
Brazil	223,519	1,075,273	117,867	690,378
Java	1,062,397	1,336,121	701,824	1,061,282
Philippine Islands	47,202	85,960	20,316	42,675
Peru	122,037	184,803	75,160	142,039
Other Countries	162,471	157,522	95,827	114,460
Total of Raw Sugars	4,561,410	4,663,570	2,734,101	3,430,793
Molasses	30,422	33,235	9,741	12,639
	....	....	2,743,842	3,443,432
Refined Sugars.				
Germany	564,753	542,060	437,842	480,589
Holland	333,023	282,709	260,618	265,333
Belgium	37,010	67,124	31,126	64,307
France	318,977	208,069	237,896	192,162
United States	185,797	4,673	149,937	4,392
Other Countries	64	86,959	37	70,421*
Total of Refined	1,439,624	1,191,594	1,117,456	1,077,204

EXPORTS.—Refined Sugars.

	Cwts.	Cwts.	£	£
Denmark	21,306	11,812	11,933	8,857
Holland	12,821	19,583	8,378	14,790
Belgium	13,131	6,846	8,166	5,289
France	18,737	1,045	10,147	776
Portugal, Azores, & Madeira	28,638	21,263	16,275	15,931
Italy	28,185	16,137	16,828	12,338
Other Countries	71,824	55,473	47,042	46,658
Total	192,642	132,239	118,769	104,639

* Imported entirely from Russia.

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of March, 1888, compared with the corresponding month of the two preceding years, and the average monthly imports for the year compared with those of 1885, 1886, and 1887, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

Countries from which Sugar has been imported.	"Lumps and Loaves."							"Other Sorts." Including Crushed Loaf, Granulated, Crystallized, &c.							Total.						
	Monthly Average.				Mar.	Mar.	Mar.	Monthly Average.				Mar.	Mar.	Mar.	Monthly Average.				Mar.	Mar.	Mar.
	1885	1886	1887	1888	1886	1887	1888	1885	1886	1887	1888	1886	1887	1888	1885	1886	1887	1888	1886	1887	1888
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
France	1597	1462	1363	1953	1343	1003	1902	463	2688	5099	1515	1018	3669	1177	2060	4150	6462	3468	2361	4672	3079
Holland	3848	3508	3780	2063	2825	4769	1634	1472	1428	2483	2648	967	2272	2108	5320	4936	6263	4711	3792	7041	3742
Germany & Austria	808	990	1347	1404	573	1253	1267	3262	6634	10463	7630	4811	11393	4114	4070	7624	11810	9034	5384	12646	5381
Belgium	189	344	592	826	450	325	1053	120	113	308	293	90	393	241	309	457	900	1119	540	718	1294
United States	707	854	454	8	2159	1010	23	8869	5078	2804	70	5719	6440	24	9576	5932	3258	78	7878	7450	47
Russia	..	..	3	..	..	..	..	875	3412	452	1449	4852	3	3906	875	3412	455	1449	4852	3	3906
Other Countries	1	..	..	..	..	..	..	24	9	15	..	..	..	..	25	9	15	..	..	..	..
Total	7150	7158	7539	6254	7350	8360	5879	15085	19362	21624	13605	17457	24170	11570	22235	26520	29163	19859	24807	32530	17449

SUGAR STATISTICS—GREAT BRITAIN.

To April 21st, 1888 and 1887. In Thousands of Tons, to the nearest Thousand.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1888.	1887.	1888.	1887.	1888.	1887.
London	57	76	79	93	83	92
Liverpool ..	126	84	83	79	125	87
Bristol	4	3	15	19	14	18
Clyde	41	49	65	68	62	81
Total ..	228	212	242	259	284	278
	Increase..	16	Decrease..	17	Increase..	6

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

For the four principal Ports. In Thousands of Tons, to the nearest Thousand. For March, 1888 and 1887.

	STOCKS. April 2nd.		DELIVERIES. In March.		IMPORTS. In March.	
	1888.	1887.	1888.	1887.	1888.	1887.
New York	82	69	53	86	71	81
Boston	9	13	14	19	15	18
Philadelphia....	4	1	15	14	17	14
Baltimore	..	..	..	..	..	..
Total......	95	83	82	119	103	113
	Increase..	12	Increase..	37	Decrease ..	10
Total for the year..			220	271	268	251

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, April 12th, 1888.

Fair Refining.	96o/o Centfs.	Granulated.	Stand. A.	Stock in Four Ports.
April 12, 1888.—4 13-16c.	5½c.	6¾-13-16c.	6¼c.	Jan. 1, 1888— 47,798 tons.
April 14, 1887.—4 9-16c.	5⅛c.	5¾c.	5⅝c.	Jan. 1, 1887—102,279 tons.
April 15, 1886.—5 1-16c.	5¾c.	6⅜-7-16c.	6-6 1-16c.	Jan. 1, 1886— 57,328 tons.
April 16, 1885.—4 9-16c.	5¼c.	5 15-16c.	5½c.	Jan. 1, 1885— 89,186 tons.
April 10, 1884.—5⅞c.	6 5-16c.	7c.	6⅝c.	Jan. 1, 1884— 60,900 tons.
April 12, 1883.—7c.	7 11-16c.	8 11-16c.	8 3-16c.	Jan. 1, 1883— 50,297 tons.
April 13, 1882.—7½c.	8 9-32c.	10c.	9⅜c.	Jan. 1, 1882— 43,927 tons.
April 14, 1881.—7 3-16c.	8c.	9 5-16-⅜c.	8⅞-9c.	Jan. 1, 1881— 66,999 tons.
April 8, 1880.—7⅝c.	8 9-16c.	9½c.	9-9¼c.	Jan. 1, 1880— 63,558 tons.
April 10, 1879.—6⅛c.	7¼c.	8⅛c.	7⅞-8c.	Jan. 1, 1879— 50,773 tons.
April 11, 1878.—7⅜c.	8 5-16c.	9½c.	9¼c.	Jan. 1, 1878— 48,230 tons.
April 12, 1877.—8¾c.	9 13-16c.	11-11⅛c.	10⅝-¾c.	Jan. 1, 1877— 25,885 tons.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE 31ST MARCH, FOR THREE YEARS, IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts.*	TOTAL 1888.	TOTAL 1887.	TOTAL 1886.
226	*195	21	*255	116	21	834	920	995

* Estimated.

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING 31ST MARCH, IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts.*	TOTAL 1888.	TOTAL 1887.	TOTAL 1886.
1267	413	45	427	210	337	2639	2669	2528

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROP, OF THE THREE PREVIOUS CAMPAIGNS.

(From Licht's Monthly Circular.)

	1888-89. Tons.	1887-88. Tons.	1886-87. Tons.	1885-86. Tons.
France	500,000	405,000	486,443	298,407
German Empire	1,070,000	910,000	1,018,842	838,131
Austro-Hungary	515,000	412,500	523,060	377,032
Russia and Poland.	450,000	430,000	479,582	537,860
Belgium	155,000	135,000	132,570	88,421
Holland	45,000	36,000	32,263	21,244
Other Countries	65,000	56,050	56,050	55,500
Total	*2,800,000	2,384,550	2,728,810	2,216,595

As compared with last month's estimate, the present one shows a reduction of 25,000 tons, namely, Germany, 55,000 tons: on the other hand an increase is set down to Belgium of 20,000 tons, and Holland, 10,000 tons.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

The market for raw sugars during the past month has again been disappointing. Whilst cane kinds remain about the same, beet 88% has fallen 9d. per cwt.—the present quotation being 13s. 4½d., and for new crop, October-December, 12s. 10½d. per cwt. The latest advices from New York, are, however, cheering; the supplies drawn from Louisiana have come to an end, and the American refiners have now to fall back upon colonial sugars. The Cuban crop, as well as that of the Philippine Islands, is certain to show a deficit upon last year, and as these sugars have, in recent years, almost all gone to the States, we may look for an active competition, on the part of the States, with our refiners, in other markets, later on.

Notwithstanding opinions to the contrary, it seems to us that an important rise in the value of raw sugars is inevitable, during the next three or four months.

The imports of foreign refined at the four principal ports of the United Kingdom for the first three months of 1888, show a falling off, as compared with 1887, of 11,398 tons. The figures being, for 1888, 59,580 tons; 1887, 71,978 tons.

The deliveries, this year, into the United Kingdom (four principal ports) up to April 21st, were 16,287 tons less than for the same period of 1887; and the imports show an increase of 6,267 tons.

The stocks at the four principal ports of the United Kingdom, on April 21st, 1888, were 227,631 tons, against 211,522 in 1887—or an increase of 16,109 tons—whilst the stocks in London and Clyde are 26,210 tons less, those in Liverpool are greater by 41,979 tons.

Present quotations for the standard qualities, as under, are:—

FLOATING.			Last Month.
Porto Rico, fair to good Refining	13/6 to 14/-	against	13/6 to 14/-.
Cuba Centrifugals, 96°/o polarization	14/6 to 15/-	,,	14/6 to 15/-.
Cuba Muscovados, fair to good Refining	13/6 to 14/-	,,	13/6 to 14/-.
Java, No. 15 to 16, good to strong	15/6 to 15/9	,,	15/9 to 16/-.

LANDED.			Last Month.
Madras Cane Jaggery	9/- to 9/6	against	9/6 to 9/9.
Manila Cebu and Ilo Ilo	9/- to 10/-	,,	9/- to 10/-.

Paris Loaves, f.o.b.	17/6 to 17/9	against	17/9 to 18/3.
Titlers	19/6	,,	19/6
Tate's Cubes	20/9	,,	20/6
Austrian-German Beetroot, 88°/o f.o.b.	13/4½ to 13/6	,,	14/3

THE

SUGAR CANE.

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☞ **The writers alone are responsible for their statements.**

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to Henry Thorp, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see page iii.

From want of space we are compelled to hold over until next month our usual Monthly Patent List.

It is worth noting that the imports of beet sugar into New York from 1st January to May 15th, which last year amounted to nearly 32,000 tons, are this year only just over 600 tons.

The Cuban crop may now be said to be virtually over. We have not the figures yet, showing the actual result, but it is generally thought to be from 15 to 20 per cent. below that of last year; and the prospects for the next crop in consequence of the continued drought, are said to be gloomy.

The *Merchants and Planters' Gazette* (Mauritius) says:—"The weather has been as favourable as the preceding months, and vegetation throughout the island is in full luxuriance. The hurricane season being over, the colony may now look to one of the finest crops recorded for many years past, provided we continue to be favoured with rain till about June next. On the whole the prospect is bright."

The latest information respecting the New York Electric Sugar Refining Company, is, that they are said to be making satisfactory progress towards a successful demonstration.

In January it was stated that in a couple of months we should see cargoes of sugar refined by this process—It is now the end of May.

Professor Harrison in his report, as Inland Professor of Chemistry and Agricultural Science (Barbados), states that five hundred and thirty-four samples of sugar were examined, of which five hundred and sixteen were of Muscovado sugar for polarization only. As these were derived from all parts of the island, their average polarization may be taken as probably representing that of last year's crop; it was 89·7%, the extremes being 81·7% and 95·7%.

On Friday, May 4th, a meeting of some of the largest fruit growers in Kent was held in Sittingburne, to hear a paper read by Mr. D. Tallerman on the commercial realization of fruit. A local committee was afterwards formed to work with a central committee, which has for its object the sale of fruit, thus dispensing with the middleman. If extensively carried out, this movement will affect a radical change in the commercial transactions hitherto followed by Kentish fruit growers.

Mr. Licht, in his last monthly circular, gives two estimates for the European crop 1888-89. One based upon last year's yield, and which gives a total of 2,575,000 tons; and the other based upon an average yield, and which gives 2,800,000 tons.

	Upon an Average Yield.	Upon last Year's Yield.
France	490,000 tons.	425,000 tons.
German Empire	1,070,000 ,,	970,000 ,,
Austro-Hungary	515,000 ,,	480,000 ,,
Russia and Poland	450,000 ,,	440,000 ,,
Belgium	165,000 ,,	155,000 ,,
Holland	45,000 ,,	42,500 ,,
Other Countries	65,000 ,,	62,500 ,,
	2,800,000 ,,	2,575,000 ,,

(See page 343.)

The Draft Convention drawn up by the International Sugar Bounties Conference has been under the consideration of the different Governments, and it is stated that the communications received have been, without exception, favourable to the adoption of the Convention, which, with certain reservations, provides for the abolition of the Bounty System.

Baron Henry de Worms, acknowledging a resolution of thanks passed by the Liverpool branch of the Workmen's Anti-Sugar Bounty Association, says that, from his personal knowledge of the circumstances, he is convinced that the abolition of the bounties on sugar would confer an immense benefit on a numerous section of the community. The close of the recent Conference does not, of course, exhaust the interest in the subject, and he trusts that the members of the Anti-Bounty Association and of kindred institutions, recognising that the present is an especially acceptable time for finally settling the troublesome question, will see the importance of dissipating many of the delusions which have been sedulously gathered round it by some opponents of the Government for factious purposes. He would, above all, commend to their consideration whether the action of those members, or otherwise, pledged to the abolition of bounties, in now reversing their attitude, is in the best interests of working men.

The following is from the *American Grocer*:—"The leaders of the Democratic faction, New York, have begun a fight against the Sugar Refineries Co. On Monday there was an array of eminent counsel before the Attorney-General of the State of New York to persuade that officer that it was his duty to institute suits against the Sugar Trust. They claimed that the trust had exercised certain corporate rights and franchises not granted them by the State. They had used the corporate name, the common seal, and had contracted obligations under such a name, privileges belonging exclusively to bodies incorporated under the laws of the State. The code of civil procedure empowers the Attorney-General to proceed against one or more persons who act as a corporation without being duly incorporated, or who exercise any of the corporate rights, privileges, or franchises not granted them by the law of the State.

"Against these arguments, it was argued by Mr. John E. Parsons and others, on behalf of the Sugar Refineries Co., that the trust has not usurped the functions of a corporation, and a general denial was made. It was alleged that the proceedings had been started avowedly for political effect by a political organization, and were without just foundation. The specific complaint against the North River Refining Co., on the ground that the refinery had been closed by direction of the Sugar Trust, was answered, that this refinery had been stopped because of the act of the Legislature in laying out new parks on ground which took in the property of the refinery. As new appliances were needed to do a paying business, the refinery was stopped pending park matter. Mr. Parsons continued by saying that the sugar companies had been doing a losing business for years *(sic)*. They formed the arrangement by which the appliances of one refinery were placed at the disposal of another. The men in the board simply become holders of stock in the refineries of all the companies in the agreement. The agreement showed the objects of the combination were laudible, and Mr. Parsons challenged the other side to produce a single thing that had been done unlawfully."

In the April *Sugar Cane*, page 173, we alluded to the report that Mr. Claus Spreckles was about to start an enormous sugar refinery in Philadelphia. Our Consul in that city (Capt. R. C. Clipperton), in his report, dated April 10th, gives the following particulars respecting it:—

"Twenty-five architects are at present engaged on the detail plans. The buildings will cover a plot of ground 1,500 ft. by 400 ft.; the wharfage facilities will be 3,200 ft.; some of the buildings will be nine stories high, others 11 stories; the cost of construction, &c., will be between three and four million dollars, which will include the construction of the buildings and the necessary machinery. The number of men required to keep such an extensive establishment running to its full capacity will be 1,500. The consumption of coal will be 250 tons daily, and 15,000,000,000 gallons of water will be required per annum. The raw sugar, beetroot, and cane, to a large extent will be imported by Mr. Spreckles direct from the West Indies and Germany, and purchases will also be made in the open markets of this country. An ordinary steamer's cargo will be consumed every two days, averaging a daily output of 600 hogsheads, and 60 car loads, 1,600,000 pounds, will be shipped daily from the city, which does not apply to the consumption in Philadelphia with her million of inhabitants. Centrifugal beetroot sugar will be used, about one-third being mixed with two-thirds of cane, and the product will be cube, cut loaf, granulated, and various yellow sugars. Neither of the three first-named grades are made in this city at the present time.

"It is claimed that this gigantic enterprise will increase the direct trade of Philadelphia by at least 40,000,000 dollars, and an indirect increase of over 100,000,000 dollars."

THE PRESENT POSITION AND OUTLOOK OF SUGAR.

A friendly controversy has been going on between Mr. Görz and Mr. Herbertz, upon the prospects of the sugar market; and as each give the grounds upon which they form their opinion, our readers will be able, from the following summary, to form their own conclusions.

Mr. Görz's figures point to a short supply, with of course higher prices; whilst Mr. Herbertz's opinion would seem to be that we shall not see much change in values, unless the next best crop turns out to be a bad one.

Mr. Görz commences with the following figures:—

Total Imports into Great Britain from 1st April to 30th September.

1887.		1886.		1885.	
Cane.	Beet.	Cane.	Beet.	Cane.	Beet.
412,614	181,654	406,528	147,294	417,010	141,484

Reduced to raw sugar:—

1887.	1886.	1885.
614,452 tons	570166 tons	574,214 tons.

Statement of quantities disposable during these six months:—

	1887.	1886.	1885.
Stock on 1st April	200,004	306,143	291,116
Imports as above	614,452	570,166	574,214
	814,456	876,309	865,330
Deduct Stocks 1st October	179,793	245,196	293,313
	634,663	631,113	572,017

To be perfectly safe, let us take the sales (shipments) for the six months of this year (1888) at 630,000 tons. The estimate for 1888 will then be:—

	Tons.
Stock on 1st April, 1888	228,400
Deducted from quantity required for sales	630,000
	401,600
Add necessary stock on 1st October	100,000
Total imports required	501,600

Now the European deficit amounts to 354,000 tons, from which, to be safe, we deduct 45,000 tons as plus exports from the colonies, though, in our opinion, exports will this year be at the utmost not larger than last year.

Great Britain has received from 1st October to 31st March 82,423 tons of cane sugar and 324 tons of beet and refined, more than in the corresponding period of previous season, and, consequently, taking into consideration the deficit of 300,000 tons, the quantity at disposal in Europe and the colonies will be, in round numbers, 380,000 tons less than in the previous year.

This figure must be reduced by 110,000 tons, as in order to get to a stock of 100,000 tons on the 1st October only 510,000 tons of imports are required instead of 610.000 tons. The remaining 270,000 tons must consequently be got from the Colonies or else the stocks in the European sugar producing countries must be less by their amount on the 1st October, 1888.

These stocks amounted on the 1st October, 1887, to about 310,000 tons in Germany, Austria, France, Belgium, Holland and Russia, so that as the difference for all these countries would only amount to 40,000 tons, it appears absolutely necessary we should look to further considerable imports from the Colonies to cover her consumption, if there are to be 100,000 tons of visible stocks on 1st October. We reserve the question for future special consideration. The solution of it seems very difficult; for we cannot up to now, see whence this is to come, as the United States, in consequence of the large exports of cane sugar will have to fall back more than ever on the Colonies to meet their requirements.

Upon this Mr. Herbertz, in the *Deutsche Zuckerindustrie* of April 27th, remarks:—

First we must point out that the "*Wochentlicher Marktbericht*" is edited by Mr. Görz and not by the writer (Mr. Herbertz). At the same time we wish also to make the avowal, that for some months we have not been at one with our worthy colleague in judging of the position of the market.

We were, and still are, of the opinion that the rise in prices in Germany in December, was too great, so that it went beyond that of the world's market, in consequence of which our exports came to a standstill. The sensible decline during the past few weeks should, however, have restored the equilibrium as is already indicated by the exports again increasing.

As regards the question of supplying Great Britain, we are no friends to such calculations, because the invisible stocks are not known, which will be drawn on more or less, according to the margin between the price of "prompt" and "future" sugars. Then there is the further fact, that in Germany and Austria all the sugar-producing establishments will, by the new law (which certainly is not passed in the latter country), be compelled to work up their stocks completely by the 1st October, and bring them for sale in the open market, or else export them.

Again, we should make the calculation for Great Britain in another way, viz. :—

	Tons.
Imports from 1st October, 1886, to 30th September, 1887, when the stock *(in raw sugar alone)* remained at 179,000 tons	1,195,574
Imports from 1st October, 1887, to 31st March, 1888	664,069
	531,505
Therefore Great Britain would have, if we assume a stock of 100,000 tons, as sufficient, and therefore deduct 79,000 tons	79,000
To import still up to 1st October, 1888	452,505
Germany has still for export (according to our calculations, above,) in round numbers	140,000
Stock in Hamburg of	71,000
Together	211,000
Whilst, on the other hand, the imports into Great Britain during the six months, April to September, 1886, amounted to	235,381

Therefore if nothing arises to cause serious fears as to the present year's (1888-89) crop of beet sugar, the present prices ought, in our opinion, to undergo no advance of any importance. On the other hand the large demands on the stocks will give the sugar trade a very strong position; and if the beet crop should again turn out small, then higher prices will become inevitable.

In the next number of the *Deutsche Zuckerindustrie*, Mr. Görz says: His worthy colleague has been making some remarks adverse to the opinion of the market, published in *Wochentlicher Marktbericht*, in support of which Mr. Herbertz brings forward a statement of the quantity of sugar on hand in Germany for export as compared with the amount of imports still required for Great Britain from April to September, 1888, based mainly upon the amount of raw beet sugar imported into Great Britian for the corresponding six months in 1887.

Mr. Görz confines himself to pointing out that the 140,000 tons which Mr. Herbertz puts in as disposable for export, form the excess remaining after supplying the home consumption for the months April to September, and if these should be exported, there would then remain on the 1st October, no sugar whatever in any of the custom warehouses, which is hardly possible.

Further, in forming an estimate of the position of the article, it is not, according to his view, possible to select two countries which, however important factors in the world's market, can yet by no means be considered to form a proper indication of the world's market itself. The figures assumed with reference to German stocks and English imports, might be very considerably changed by the relative position of the other consuming and producing countries.

His view is that all the statistics relating to the more important countries involved, so far as they are attainable, must be taken into account in estimating the probable course which the market will take, and such universal statistics he is in the habit of collecting and publishing, and has used in this case for his estimate. To sum up his (Mr. Görz's) view, his idea is that the present price of sugar does not correspond with the position (present and probable future) of the article, and that there will be, before the new campaign, a scarcity of sugar, caused by the increased competition on the part of consuming countries which has, hitherto, to a great extent, served as a source of supply for one or another customer exclusively.

This probability was already perceived at the time when the deficit in the European crop was becoming evident, and has increased during the past few months, for, according to all indications, the export from the colonies will not be so great this year as last, and a large quantity of sugar has found its way from North America to Europe, the want of which may hereafter be felt there.

The fact of the market having become weaker since then, makes no difference to the final result. Up to April the visible stocks are generally comparatively large, as the imports far exceed the consumption. Further, the colonial imports this year have been for some months *quite exceptional*, because of the high prices, and already a reaction begins to show itself felt, which will soon make itself felt, in a much quicker decrease in the visible stocks than in previous years.

The low prices quoted since December for new crop will also make no difference, for it has resulted in consumers buying only from hand to mouth, and, unless all the reports are wrong, are unusually badly provided. Again, the North American "Trust" has had the effect of preventing the development of prices, by keeping down the market for raw sugar, so that the smaller and more numerous buyers have absolutely abstained, but the Trust can afford to do the same, because it has the power of raising prices of *refined* at will, if it should have to pay higher prices.

CONTINENTAL OPINIONS ON THE SUGAR CONGRESS.

The International Congress has concluded its labours for the present, and, according to a statement made in the House of Commons by the First Lord of the Treasury, the final protocol and the draft scheme for a Convention were signed by the representatives of all the Powers, who will now submit this draft, under the reserves which have been stipulated, to their respective Governments. The latter are expected to communicate to the British Government their views in relation to the draft by the 5th July next. The representatives are invited to re-assemble in London by the 16th August at furthest, for the purpose of signing the treaty which it is hoped may be agreed on. Mr. Smith added that in its present form the draft convention is the joint property of all the Powers concerned, and it has been unanimously decided that the details are not to be published prior to the next meeting of the representatives.

Opinions on the Continent naturally vary considerably. The French sugar journals are opposed *in toto* to the signing of any agreement whatever.

The *Sucrerie Indigène* expresses itself as follows:—"England wants to get everything and grant nothing. This is the thought which occurred to us at the outset in noticing both the earnestness with which she set to work to promote a Conference, and the zeal which was afterwards shown by the president, Baron de Worms, in endeavouring to bring it to a successful issue. The aim of England is now quite evident; all the Powers which have been drawn into the Conference feel this; and if it is true that they account for their action in from the very first lending an ear to a proposition so tempting, from a financial point of view, as the abolition of premiums on sugar, one cannot conceive that they will not now put alongside of this advantage the destruction, in the case of some of them, of the finest and most profitable of their agricultural industries. For if the projects of the London Conference should be realized in the manner that England desires for the sake of her colonies, her mercantile marine, and her metropolitan refiners, we should soon see cane sugar taking the lead and annihilating the cultivation of the beet. All the Continental producers of beet sugar, whether French, Belgian, German, or Austrian, now take the same view of the matter; public men, statesmen, manufacturers, agriculturists, are all convinced of what has been stated, and are repeating it in every direction. Why, then, should the farce continue to be played?"

Mr. B. Dureau in the *Journal des Fabricants de Sucre*, sums up by declaring that England may be master of the situation, but only by sacrificing all the free trade doctrines which she has professed up to now.

With regard to the report that the English Government had formulated a declaration, relative to the exclusion from England and her colonies of sugars from all countries which do not take part in the Convention, or which give premiums, whether open or concealed,—the editor of the *Deutsche Zuckerindustrie*, remarks:—"If such a condition is to be a part of the programme, there is no difficulty in embodying it also in an international convention. This much is quite clear to us, that if the English Government should decide on levying compensatory duties, Germany, Austria, Russia, and Holland, (on account of Java) will give up the premiums. And then we shall get rid of any fear of a rise in prices in the English market corresponding to the compensatory duty, for the very large production of the countries named will have to continue to carry on the competition of the world's market with the remainder of the raw sugar producing regions. If the English Government cannot decide upon such a regulation, the conference will probably lead to no result.

Mr. Görz, in the *Wöchentlichen Marktbericht*, maintains his sceptical views as to the ultimate successful outcome of the conference. He says:—"Time alone will show how far this declaration of the English Government is practicable to be carried out, in face of the existing treaties of commerce; it will not be very easily done off-hand, and one is almost inclined to see in this declaration a sort of beginning of withdrawal on the part of the English Government."

The *Bulletin des Halles* is also quite sceptical as to the result of the Conference, and points out that it will not be the first time that an attempt to do away with premiums has ended in smoke.

THE SUGAR INDUSTRY IN FLORIDA.

Analysis of Five Lots of Sugar Canes sent by the Florida Sugar Manufacturing Co., St. Cloud, Osceola Co., Florida.

REPORT OF Mr. W. P. KIRCHHOFF,

Chemist to the Louisiana Sugar Exchange.

I hereby certify that I have examined the mill-juices of the five lots of sugar canes marked as below, and find them to contain as follows:—

March 7th, 1888.

Lot 1.—Three (3) stalks "Red Ribbon Cane":—

	Lbs.	oz.
Average number of joints to each cane	15	
The weight of three stalks	10	10
,, ,, Bagasse	3	2½
,, ,, Juice extracted	7	6½
The percentage of juice extraction on the weight of cane	70·294%	

The Analysis of the Mill-Juice.

The juice was slightly acid with litmus paper.

Colour, dark greenish blue.

Baumé, 9·1° at 56¾° Fahrenheit (13¾° C.)

Brix, 16·6° at 56¾° F. (13¾° C.) Corrected Brix, 16·4°.

	Per cent.
Sugar in solution	13·100
Glucose or inverted sugar	1·286
Water	83·600
Impurities	2·014
	100·000
Specific gravity	1·0674
Co-efficient of purity	79·93
Total solids	16·4
Glucose to 100 of cane sugar	9·81

March 7th, 1888.

Lot. 2.—Three (3) stalks "Green Ribbon Cane":—

	Lbs.	oz.
Average number of joints to each stalk	12	
The weight of three stalks	11	4
,, ,, Bagasse	3	2
,, ,, Juice extracted	8	2
The juice extraction on weight of cane	72·22%	

THE ANALYSIS OF THE MILL-JUICE.

The juice was slightly acid to blue litmus paper.
Colour, dirty green, not so dark as Lot 1.
Baumé, 10·6° at 56⅝° Fahrenheit (13⅛° C.)
Brix, 19·2° at 56⅝° (13⅛° C.) Corrected Brix, 19·0°.

	Per cent.
Sugar in solution	17·000
Glucose or invert sugar	1·126
Water	81·000
Impurities	0·874
	100·000
Specific gravity	1·0788
Co-efficient of purity	89·47
Total solids	19·0
Glucose to 100 of cane sugar	6·62

March 8th, 1888.

Lot 3.—Three (3) stalks "Bourbon Cane":—

	Lbs.	oz.
Average number of joints to each stalk		13
The weight of three stalks	7	15
,, ,, Bagasse	2	7½
,, ,, Juice extracted	5	7½
The juice extraction on the weight of cane	68·89%.	

THE ANALYSIS OF THE MILL-JUICE.

The juice was slightly acid to litmus paper.
Colour, dirty green.
Baumé, 9·1° at 59° F. (15° C.)
Brix, 16·6° at 59° Fahrenheit (15° C.) Corrected Brix, 16·5°.

	Per cent.
Sugar in solution	13·100
Glucose or invert sugar	1·627
Water	83·500
Impurities	1·773
	100·000
Specific gravity	1·0678
Co-efficient of purity	79·39
Total solids	16·5
Glucose to 100 of cane sugar	12·42

March 8th, 1888.

Lot 4.—Three (3) stalks "Crystalline Cane":—

Average number of joints to each stalk 11

	Lbs.	oz.
The weight of three stalks	8	2½
,, ,, Bagasse	2	6¾
,, ,, Juice extracted	5	11¾
The juice extraction on the weight of cane	70·306	

The Analysis of the Mill-Juice.

The juice was slightly acid with litmus paper.
Colour, dirty green.
Baumé, 8·6° at 56¾° Fahrenheit (13¾° C.)
Brix, 15·8° at 56¾° F. (13¾° C.) Corrected Brix, 15·6°.

	Per cent.
Sugar in solution	12·700
Glucose or invert sugar	1·344
Water	84·400
Impurities	1·556
	100·000
Specific gravity	1·0639
Co-efficient of purity	81·41
Total solids	15·6
Glucose to 100 of cane sugar	10·58

March 9th, 1888.

Lot 5.—Three (3) stalks "Green Cane":—

	Lbs.	oz.
Average number of joints		10
The weight of three stalks	12	11
,, ,, Bagasse	3	6
,, ,, Juice extracted	9	5
The juice extraction on the weight of cane	73·39%.	

The Analysis of the Mill-Juice.

The juice was slightly acid to blue litmus paper.
Colour, dirty green.
Baumé, 11·° at 63½° Fahrenheit (17½° C.)
Brix, 20·0° at 63½° F (17½° C.)

	Per cent.
Sugar in solution	17·400
Glucose or invert sugar	1·157
Water	80·000
Impurities	1·443
	100·000
Specific gravity	1·0832
Co-efficient of purity	87·00°
Total solids	20·0
Glucose to 100 of cane sugar	6·65

Tabulated Analysis of the Five Lots of Canes.

Lot No.	Marks.	Baumé.	Brix or Total Solids.	Sucrose or Cane Sugar.	Glucose or Invert Sugar.	Water.
		°	%	%	%	%
1	3 stalks "Red Ribbon" ..	9·1	16·4	13·1	1·286	83·60
2	,, "Green Ribbon" ..	10·6	19·1	17·0	1·126	81·00
3	,, "Bourbon"	9·1	16·5	13·1	1·627	83·50
4	,, "Crystalline"	8·6	15·6	12·7	1·344	84·40
5	,, "Green Cane" ..	11·0	20·0	17·4	1·157	80·00

Lot No.	Marks.	Impurities.	Co-efficient of Purity.	Specific Gravity.	Glucose to 100 of Sucrose.
		%			
1	3 stalks "Red Ribbon" ..	2·014	79·93	1·0674	9·81
2	,, "Green Ribbon" ..	0·874	89·47	1·0788	6·62
3	,, "Bourbon"	1·773	79·39	1·0678	12·42
4	,, "Crystalline" ..	1·556	81·41	1·0639	10·58
5	,, "Green Cane" ..	1·443	87·00	1·0832	6·65

The actual Yield of Total Sugar per ton of Cane (2000lbs.), calculated from the respective Mill-Juice Analysis, and based on different Juice Extractions of the Mill.

Lot No.	Marks.	Juice Extraction of Mill.					
		@ 50 per cent.	@ 60 per cent.	@ 65 per cent.	@ 70 per cent.	@ 75 per cent.	@ 80 per cent.
1	"Red Ribbon"	98·	117·6	127·4	137·2	147·0	156·8
2	"Green Ribbon" ..	150·0	180·0	195·0	210·0	225·0	240·0
3	"Bourbon"	97·0	116·4	125·1	135·8	145·5	155·2
4	"Crystalline"	98·0	117·6	127·4	137·2	147·0	156·8
5	"Green Cane"	148·0	177·6	192·4	207·2	222·0	236·8

DEDUCTIONS AND CONCLUSIONS.

From inspection of the above respective analysis of the five lots of sugar cane expressed to me for analytical examination, it will be seen that Lots 1 ("Red Ribbon"), 3 ("Bourbon"), and 4 ("Crystalline") are very nearly the same in chemical composition, as well as in the *actual yield of total sugar* per ton of cane at the different percentages of juice extraction on the weight of cane. Lots 2 and 5, respectively "Green Ribbon" and "Green Cane," also are nearly the same in chemical composition, as well as in the actual yield of total sugar per ton of cane. The samples of "Green Ribbon" cane is decidedly the best and richest cane of all the lots, then comes the "Green" cane; the others all rank about the same. In composition, general appearance, and yield per ton of cane, the "Red Ribbon," "Bourbon," and "Crystalline" canes are the same as our average Louisiana canes; the "Green Ribbon" and "Green Cane" are far superior to any canes worked up here on the average Louisiana sugar plantations; a mill-juice testing 17% of cane sugar is a juice which the sugar planter of Louisiana is exerting all his force, energy, and methods to bring about, but so far he has not been successful in his efforts; the average mill-juice of Louisiana cane is of the following composition :—Cane sugar, 13·0%; glucose, 1·00%; water, 84·0%; impurities, 2·0%.

In studying the analysis of the respective mill-juices, I am forcibly struck with the high content of glucose of all the juices, considering the high percentage of cane sugar, the percentages of glucose seem to me *inconsistently high*; a cane juice containing 17% of cane sugar should, in my judgment, show on an average no more than from $\frac{2}{10}$ to $\frac{1}{2}$ of one per cent. of glucose; judging from the analysis only, and having no record of the history of the lots of canes sent to me, I can merely surmise as to the probable cause of this high percentage of glucose; my impression is that the canes must have been either blown down sometime before cutting, and thereby suffered from second growth, or received too much rain shortly before being cut.

By the actual yield of total sugar per ton of cane, is meant the number of pounds of all sugars per ton of cane that could actually be barrelled up in a sugar-house containing all the modern improvements and arrangements of parts, and with a mill securing an average juice extraction of any of the above calculated extractions on canes whose mill-juices are respectively of the same composition as those examined. The method I have adopted in calculating the actual yields of sugar per ton is one which I have used for years, and found very reliable on mill-juices of Louisiana sugar canes; I see no reason why it should not be applicable to Florida mill-juices, and be just as correct.

The mill-juices, upon which the foregoing analysis were made, were secured by a small three roller hand-mill, manufactured by George L. Squire & Co., Buffalo, N.Y.; the rollers are of cast-iron, about six inches in length, and four or five inches in diameter; as will be noticed, the mill did excellent work, making an average juice extraction of 71·02% on the five lots of cane.

The bundle of canes arrived here (March 6th) in a perfect state of preservation, showing no signs of having lost in weight by drying out. The eyes of some of the canes proved to be dead, killed no doubt in the field by frost.

With sugar-houses equipped with the best machinery, complete in every detail as to arrangement of parts, and *with mill-juices* of canes such as the "Green Ribbon" and the "Green Cane," Florida has in her hand brilliant opportunities of becoming, in a short space of time, the best and most powerful sugar State in the United States, Florida having the following points in her favour:—

1. The uniform climate,
2. The exemption (as a rule) from frost,
3. The maturity of the sugar cane,
4. A grinding season of indefinite length,
5. An average large yield of sugar per ton and acre,

will, if her people will avail themselves of the golden opportunity, and act on their appreciation, become the greatest sugar producing State (that is to say, per ton of cane or acre,) in the United States.

Laboratory, 33, North Front Street, Room 3,
P.O. Bos. 3330, New Orleans,
March 13th, 1888.

BROWN COAL AND WOOD CHAR IN THE FILTRATION OF CANE JUICES AND SYRUPS.*

BY W. J. THOMPSON.

Calumet Sugar-House, Bayou Teche, Louisiana,
Wednesday, February 29th, 1888.

Dear Sir,—Pursuant to the conditions attaching to 9 tons of German lignite furnished him by the U. S. Department of Agriculture for experimentation in cane-juice filtration at this factory, I am instructed by Mr. Daniel Thompson, its proprietor, under whose exclusive patronage the experiments have otherwise been conducted, to make you the following report concerning the same:—

A miniature apparatus comprising mill, steam-defecators, open steam-evaporators, subsiders, and a laboratory, frame filter-press from Wegelin and Hubner, center-feed, executed in bronze, of one-half square foot filtering area, arranged for complete displacement, offered reasonable facilities at all times to small work. Four Kroog presses of thirty frames, 220 square feet filtering surface each, so mounted with respect to receiving vessels, juice, and lixiviating pumps, safety-valves, and like appurtenances as to have operated upon scums throughout the season without suggesting alteration, besides eliciting the eulogiums of the inventor of the so-called Brown coal process, served during industrial trials. All pipes were of copper or brass, pumps of bronze, and the plates, perforated sheets, frames and other iron parts of the apparatus in contact with juice all thoroughly painted, as insurance against discolouration of products. A well-arranged chemical laboratory, usually well equipped for investigations connected with sugar, was also provided.

Mr. B. Remmers, an English expert in mechanical filtration and sugar refining, well known to readers of the *Sugar Cane* Magazine, assumed technical control of the experiments, assisted by Mr. R. A. Williams, chemist from the Louisiana Sugar Experiment Station, Mr. J. P. Baldwin, a local adept in defecation, and two long-time employes of the factory.

A preliminary study was made of cake formation. For this purpose Spanish whiting, variously coloured, as with aniline dyes and alizarine, kept mechanically suspended in water by vigorous agitation was pumped into the chambers, the cakes being finished off at high pressures to insure extreme solidity, which, after removal, were cut into sections, longitudinal and transverse, It was found that with constant or very gradually increased pressures maintained within the chambers, and a liquid kept under unaltered conditions, the cakes formed by extremely uniform accretions, beginning with a thin and even coating of the entire filtering area, over which the various colours used deposited one upon the other, as fed in succession to the press, in likewise thin and equable layers, until the chambers were quite filled and filtration ceased. With oscillatory pressures and with substances of widely differing specific gravities, such as whiting, brown coal, red lead, wood char, and ultramarine, one following upon the other, the various laminæ proved most irregular in their deposition upon the filter-bed, being comparatively of excessive thickness in parts while running out altogether in others, the plane of contact being besides often obliterated or scarcely defined, because of partial intermingling between the different substances employed. The same effects, also, found their cause in the use of any given substance fed alternately in fine and coarse division, or at first in high followed by low per cents of the matrix.

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* Report addressed to Dr. H. W. Wiley, Chemist, U.S. Department of Agriculture, Washington.

There can be little doubt that for the best results in general filter-press work, this indicates, as afterwards substantiated for sugar liquors by the use of hydrostatic columns on the one hand and intermittency secured through means of a by-pass valve on the other, the first importance of constant pressures, freed especially from the vibratory pulsations of ordinary pumps, and a liquid so agitated while awaiting the process as to carry to the press, at all stages of this, a reasonably uniform percentage of whatever matrix is employed the laws of hydraulics, as illustrated in silt-bearing streams, here again exhibiting themselves in complete application.

Satisfied that the mechanical arrangement of the large apparatus was appropriate to the intervention of a matrix and that the small answered to all the essential conditions of the large, systematic work with brown coal, under what is known as the Kleemann process, began on November 29th. Five long tons of this article had been imported by Mr. Daniel Thompson, through the Sangerhausen Maschinenfabrick, Germany, which, however, was so superlatively unfit for its destined duty by reason of uneven and inadequate pulverisation, as to have required previous and, of course, laborious hand-sifting.

It was first sought to learn what relation varying quantities of this article bore to speed in the filtration of defecated but unskimmed juices. With this intent different percentages, based upon the estimated weight of the contained sucrose, as the most convenient, although not, assuredly, the most rational standard of reference, were employed with the results which follow:—

Lignite, per cent. on contained sucrose.	Juice filtered per operation; 30-frame, Kroog press. (Approximate gallons.)		Average time of one operation. (Approximate hours.)		Average juice per press, per 24 hours. (Approximate gallons.)	Average juice per square foot; filtering area per 24 hours. (Approximate gallons.)
	Minima.	Maxima.	Filtering.	Lixiviating and emptying.		
7·5	2,800	2,900	8	3	6,220	28·3
15	2,000	2,100	[illegible]	3	5,466	24·6
22·5	1,500	1,600	4·5	2·5	5,296	24·1
30	1,200	1,300	3	2	6,000	27·2
45	950	1,050	1·5	1·5	8,000	36·3
60	700	800	0·75	1	10,275	46·7

The average juice per press and per square foot of filtering surface, per twenty-four hours, stand calculated on the bases of a 60-day continuous run. Here, taking the average weight of the juice at 8·85 pounds per gallon, and its sucrose at 13½ per cent.—for per cents of lignite upon sucrose contained may be substituted per cents of the same on the weight of juice or pounds of the former per 100 gallons of the latter, as exhibited in the annexed scheme:—

Lignite, per cent. on weight of sucrose in juice	7·5	15	22·5	30	45	60
Lignite, per cent. on weight of juice	1	2	3	4	6	8
Lignite, in pounds per 100 gallons of juice	8·85	17·70	26·55	55·40	53·10	70·80

The juices treated during the interval of this work remained, so far as could be ascertained, essentially uniform as respected adaptability to filtration, as, indeed, they have done up to present writing; being referred in this regard, occasionally, to an arbitrarily selected standard by careful weighings of defecated juice, brown coal and products operated upon in observed times on tared paper filters. The analysis of raw juices for those dates which cover this series of determinations, as made in the course of diurnal routine work, as presented below.

While they may serve for general comparison with the like as observed in other portions of our tropical cane belt, no relation has yet been noted to exist between the amounts of sucrose, reducing sugars or other known constituents of the juice, and the difficulties exhibited by this in filtration. In the latter regard it is not possible to say if that which has here been experimented upon fairly represents Louisiana's average. It would seem, indeed, to be otherwise, since, in the treatment of scums, great difficulty is reported to have been experienced in almost, if not every, other local factory possessing filter-presses, while at this no other process of manufacture was throughout so satisfactorily performed.

Date.	9 p. m.				3 p. m.				9 p. m.			
	Solids.	Sucrose.	Glucose.	Exponent.	Solids.	Sucrose.	Glucose.	Exponent.	Solids.	Sucrose.	Glucose.	Exponent.
1887												
Nov. 30	15.96	13.5	1.45	84.58	......	......	......	......	......	......	......	......
Dec. 1	15.03	12.0	1.31	79.84	15.23	11.6	1.25	76.16	15.43	12.0	1.14	77.77
2	15.30	12.1	1.27	79.08	14.78	11.0	1.00	74.42	14.43	11.7	1.33	81.08
3	15.27	12.3	1.52	80.55	14.07	11.2	1.47	79.60	13.78	9.7	1.56	70.39
5	14.09	10.4	1.62	73.81	14.69	10.7	1.50	72.83	14.91	11.5	1.36	77.12
[illegible]	14.18	10.1	1.50	71.22	14.03	11.0	1.43	78.40	14.23	11.2	1.36	78.70
7	14.06	10.8	1.45	76.81	14.58	10.7	1.50	73.38	......	......	......	......
8	14.43	11.5	1.66	79.69	14.77	11.5	1.51	77.86	......	......	......	......
[illegible]	14.63	11.7	1.56	79.97	14.69	11.3	1.38	76.92	......	......	......	......
10	13.96	11.3	1.48	80.94	14.69	11.5	1.47	78.28	14.96	11.4	......	76.20
12	15.09	11.7	1.64	77.53	15.68	12.1	......	77.41	14.00	11.6	......	82.85
14	14.17	12.1	1.61	85.39	14.93	12.1	1.66	81.04	14.20	11.3	......	79.57
15	15.08	11.9	1.47	79.17	15.09	11.8	......	78.19	......	......	......	......
16	14.68	12.5	1.66	85.44	14.69	12.9	1.43	87.81	......	......	......	......
17	14.97	12.0	1.64	80.16	14.69	13.4	1.45	91.21	......	......	......	......
19	15.16	12.3	1.35	81.13	15.43	12.6	1.34	81.65	15.29	13.6	1.22	88.94

Average solids ....14·72
Average sucrose ....11·68
Average reducing sugars (glucose) .... 1·44
Average coefficient of purity, (exponent)......79·34

Plant cane, 27·5 tons (*circa*) per acre, blown prostrate September 16.

From these trials the resulting extremes, in round numbers, have alone been given. Variations in temperatures and in pressures, both with juice and displacement water; in density and completeness of defectation with the former; in perfection of cake and lixiviation sought, as in other similiar variables, some premeditated, others at times uncontrollable, render, as will be understood by a trained experimentalist like yourself, absolutely definite and thoroughly iron-clad figures quite out of the question. The average amounts of juice put through given filtering areas in fixed times have, however, in fact, most nearly corresponded with those presented as minima.

In general, it may be safely said, the most satisfactory filtrations were uniformly of juices slightly acid only, 180° F. (*circa*), under pressures which, initially low, were most gradually increased until, at finishing-off, 60 lbs. per square inch had been attained. Neither reasonable increase of pressure nor higher temperatures than these availed perceptibly. Boiling after the addition of the lignite produced no good result later in filtration, when intimate admixture of matrix and liquid had been maintained. Of displacement, or the depletion in sugar of the cake, more will be said hereafter.

Utterly at variance as the coal percentages and time volumes indicated are with promises which had preceded the process to this country, they proved as persistent as they are disappointing. From 30 to 45 per cent. on the estimated crystallizable product present were shown over and over again to be the smallest of coal consistent with reasonable amounts of work done in given times, with given filtering areas, whether by the experimental or the working apparatus. Upon this last from one to three consecutive defecators, of exceeding 1,300 gallons each, were repeatedly essayed. Separate treatment of skimmed liquors and their scums did no better in the aggregate. Those substances which peculiarly interfere with filtration appear to be removed only in minimum degree with the skimmings and sediments. Were this otherwise, separation and recovery of juice from the latter by filter-pressing, as now practised, would scarcely be feasible. It was the same whether with a lime, a sulphurous acid and lime, a lime and phosphoric acid, an acid sulphite of alumina, or an acid albumen defecation, under the Willcox patent; and with these re-agents in all proportions. Tannic acid extracted colouring matter from the brown coal, as did phosphoric and some other chemicals, without facilitating filtration. The use of lignite in alkaline solution is forbidden by its solubility in such. Basic lead acetate showed no better effects with the small press than the rest. Carbonatation alone succeeds, and this, as you told me, requires no lignite. Repetition, later repeated, with foreign lignite prepared under Mr. Kleemann's individual supervision and furnished by your department, as also with native coals obtained from the Louisiana Sugar Experiment Station and other sources, comminuted at home, aggravated the disappointment. All degrees of pulverization were tried. The amounts filtered seemed tolerably constant for stubble and plant-cane juices and for juices from freshly cut canes and from those many weeks windrowed. From old land cane they did doubtfully better than from new; those deteriorated as a frost effect not altogether so well, perhaps, as those not so injured. With cane freed from its adhering *cerosin*, by sand-papering prior to crushing, it went no better. Butts showed no decided superiority to middles and tops.

In all cases the filtered juices, whether from skimmed liquors or scums or the two treated without previous separation, whether from high or low percentages of brown coal and with whatever defecating agent employed, were exceedingly bright and clear from the first until running had quite ceased altogether. Another disappointment, however, awaited inquiry into the actual improvement as to purity secured. The exponent, on the average, was raised not materially to exceed one per cent. of total solids attributable to the coal, exclusive even of sweet-waters. A few analyses,* taken at random from the laboratory records, sufficiently illustrate this. In every case the non-filtered and filtered samples represent, as nearly as practicable, the same juice. For the large presses these were taken in equal volumes at the discharge openings of defecators and presses, respectively, at intervals of three minutes, always so as to represent by pairs identical defecators of juice and identical defecations, before and after filtration, which, following adequate admixture of each series, as obtained from individual defecators, were re-sampled. This was permitted by the admirable arrangement of the coal-mixing receivers, which contained, each, precisely the amount from one defecator, and which were filled and emptied alternately in rotation. The effect of a thorough cake washing, the sweet-water being mixed back proportionately with the filtered juice, of which it was the after-product, is shown in the last two analyses.

After that, due to the use of 10 or 15 per cent. of lignite on the weight of sugar present, no commensurate effect was observed to be produced in the direction of increased purity by the addition of further quantities. This fell off very slightly or not at all, however, as filtration proceeded towards its finishing point, as also more or less in lixiviation, depending, as seemed shown, upon a lower or higher percentage of coal employed. Believing the application of the process to Louisiana juice, condemned by the excessive quantities of lignite found essential to sufficiently rapid filtration and by its failure to realize a higher gain in purity, before reaching conclusive knowledge of these minutiæ it should be said these have not since been accorded that systematic inquiry which, otherwise, they would have deserved.

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* For these Analyses see page 315.

As decolorizers of saccharine liquors, either dilute or concentrated, certain brown coals are, on the other hand, suprisingly effective. In the table annexed are given to the nearest per cent. the colour repeatedly removed from defecated juices, by varying percentages of the article furnished by your Department, referred in each series to standard samples prepared from the defecated juice dealt with by mere passage through filter paper. This paper filtration is a necessity, since suspended matter, lighter in colour than the mother-liquor, partially by preventing the transmission of light through this last and partly by itself reflecting light, gives invariably, in simply subsided juices, a tint too light by a number of degrees. The percentages of colour removed were uniformly measured by the relative length of columns made to give the same tint as the untreated standard when contained in tubes of like glass, of calibre such as to avoid a decided meniscus, and with light of equal intensities transmitted from below in lines parallel to the columns' longitudinal axes.

Lignite per cent. on weight of Sucrose.	Length of columns, mm.	Per cent. colour removed.
Unfiltered.	10	..
5	28	64
10	36	72
15	50	80
20	64	84
25	80	88
30	92	89
40	100	90
50	112	91

In the foregoing the juices were treated nearly to neutrality with lime alone. With sulphurous and phosphoric acids, acid albumen, acid sulphite of alumina, or even a decidedly acid lime defecation, the per cents. removed were, of course, reduced, there being a less intense primary tint. No other lignite gave such high effects as that furnished by your Department. This will be seen from the accompanying approximations, obtained with from 22·5 per cent. to 25·0 per cent. of lignite on the weight of sucrose filtered, expressed in maxima and minima to the nearest 10, sulphur fumes having been used on the juices—the syrups not having been treated with coal prior to concentration.

Lignite, where obtained.	Per cent. colour removed.			
	Juice.		Syrup.	
	Maxima.	Minima.	Maxima.	Minima.
Sangerhausen Machine Works, Germany	60	40	45	35
United States Department of Agriculture, prepared by F. Kleemann, Germany	80	60	50	40
Louisiana Sugar Experiment Station, mined in Alabama	70	50	45	35
J. B. Friedheim, Camden, Ark	60	40	40	30
B. F. Read & Co., Mineola, Tex	60	40	40	30

The higher effect of your article is perhaps attributable, in considerable measure, to a more perfect pulverization than that secured in other samples, the degree of this exercising an undoubted influence. As was noticed in the matter of purity coefficient, after the use of some 15 per cent. further amounts added were out of all proportion to the increase in effect. The power of lignite to absorb or otherwise destroy or remove is apparently confined to those contained substances producing particular colour effects only. For these its affinity is certainly very great, animal char or bone black, in the lower percentages, being found altogether out of comparison with it in this regard. These colours suppressed, however, by a relatively small quantity of the lignite, additional quantities produce but little useful effect, the remaining colouring matters being those for which it possesses little or no affinity. This hypothesis explains the fact that, having used so much as 30 to 45 per cent. to secure rapidity of filtration, the cake from one operation was found to have lost none of its decolorizing power upon a second application, though it no longer filtered with the same efficiency. Its influence upon the exponent, also, seemed to have diminished little by like previous use upon juice, although considerably more so after the filtration of dense syrups not first treated as juice, a fact possibly finding its explanation on the same lines. Except for the Texas sample, all the coals examined gave up a slight amount of greenish colouring matter, whether boiled in distilled water, juice, or syrup, all showing likewise an acid reaction, your own being most pronounced in the latter particular.

A hard and apparently very dry cake was obtained with whatever variety of lignite, if employed in amounts above 15 per cent. of the contained sugar, provided only ample time was accorded its formation. It was, however, in all instances of high per cents, exceedingly porous as compared with scum cake finished off at corresponding pressures, weighing per press always in close proximity to the ascertained average of 670 pounds at a final pressure of 60 pounds, of which, after lixiviation at 40 pounds pressure, 49 per cent., a little more or less, was moisture.

Since with a juice polarizing 13 per cent. sucrose some 46 pounds of the latter would be otherwise lost from each pressing, equal to nearly 3 per cent. of the entire amount treated, supposing 1,300 gallons of juice to be put through, with 30 per cent. of the brown coal, at each operation, the importance of lixiviation can scarcely be overstated. No press except arranged for this supplementary process in its most complete attainment would, of course, be admissible. This work is too ununiformly accomplished by steam, by reason of channels at once cut on lines of least resistance, which, besides, leaves the press too hot for immediate manipulation and severely taxes the cloths. Hot water results in too rapid and too great a reduction of the purity coefficient, possibly because of the action of heat upon the solubility of some among the retained impurities. Cold water certainly performed best, all things considered.

The theoretical amount of so-called displacement water was found altogether inadequate. For a 30-frame Kroog press 200 liters are, for reasons not necessary to state, supposed to be the extreme limit of requirement. This amount when passed in one hour—already a serious loss of time compared with the filtration itself, which consumes but three with 30 per cent. of coal—gave at finishing-off a sweet-water still running at an average analysis of: solids, 6·77; sucrose, 5·0; reducing sugars, 0·52; exponent, 73·87. Assuming the 49 per cent. of retained moisture on the 670 pounds of cake to be juice diluted to the same figures, we should have:—

	Pounds.
As water	328·30
As contained solids	23·83
As dilute juice	352·13

equal to 52·5 per cent. of the cakes' weight, which would mean the loss per operation of 670×0·525×0·05=17·58 pounds sucrose, or 352·×0·05=17·60 pounds sucrose, or to 17·60×46·1=811·36 pounds sucrose per day's work of 60,000 gallons of juice, using 30 per cent. of lignite.

As a matter of fact, analysis of the cake showed this to contain 2·8 per cent. sucrose, or 18·76 pounds, of the latter per pressing—a seeming paradox, dispelled by physical examination. This sufficed to reveal how the water, first finding its way past the cake on its line of contact with the iron frame, thoroughly lixiviated the extreme peripheral portions of this, afterwards to pass here in important volumes without effecting any good purpose, while yet having accomplished only a very partial depletion of more central parts. Here was met the third and last serious technical objection to lignite; one which since it is multiplied by the number of pressings required for given volumes of juice filtered, must apply to the use of any matrix just in proportion as larger or smaller amounts of this are essential to the results sought.

There appeared to offer two methods of escape from this difficulty, each, however, involving a dilemma. Lower lixiviating pressures, while producing much better effects, prolonged the time required for the operation so far beyond the reasonable as would need double or treble the filter-press plant. Increased quantities of water employed reduced the exponent, prolonged the time, and increased the evaporation correspondingly. A third expedient was less effective, but offered some collateral advantages, to wit, more perfect pulverization of the matrix. There can be no reasonable doubt that the finer the state of division to which brown coal is reduced the more rapid becomes filtration, the more complete the decolorization effected, the more solid its cake, and the lower its final per cent. of retained juice. Sifted through the finest of millers' silk bolting-cloth, it performs better duty in every respect than otherwise. It is advisedly stated, and with positiveness, after repeated experiment, that lignite can not be too finely prepared, on a large scale at least, for cane-juice filtration, by any mechanical means at present command. Dissolved even in strong alkalies and reprecipitated as an impalpable powder, its efficiency is yet further enhanced.

As a last recourse higher juice pressures, even up to 300 pounds per square inch on the small press were used. This, though it unquestionably left remaining a cake charged likewise with less juice and so uniformly compact as to be better adapted to displacement, again was attended with too serious a loss of time, both in finishing off and in subsequent lixiviation, to compensate the advantage in sugar redeemed or evaporation avoided. Pressures in excess of 100 pounds per square inch are, besides, not feasible in industrial practice.

Analyses referred to at Page 310.

Date.	Defecated, not filtered.					Filtered, 30 to 45 per cent. brown coal.					Improvement in Exponent.	Remarks.
	Solids.	Sucrose.	Glucose.	Exponent.	Glucose ratio.	Solids.	Sucrose.	Glucose.	Exponent.	Glucose ratio.		
1887.												
Dec. 28 ..	16·44	13·0	1·84	79·08	14·15	16·43	13·3	1·80	80·95	14·15	1·87	Frosted cane.
,, 28 ..	16·44	13·0	1·84	79·08	14·15	16·03	12·9	1·78	80·47	13·79	1·39	Cake from the above used.
,, 29 ..	16·44	13·6	1·46	82·72	10·70	16·44	13·8	1·38	83·94	10·00	1·22	
,, 30 ..	17·05	13·9	1·25	81·52	8·99	16·48	13·6	1·19	82·52	8·75	1·00	Willcox albumem defecation.
,, 31 ..	15·00	11·7	1·44	78·00	12·30	14·70	11·6	1·40	78·91	12·07	0·91	
1888.												
Jan. 2 ..	15·00	12·6	1·20	84·00	9·52	15·30	13·0	1·30	84·97	10·00	0·97	
,, 3 ..	15·17	12·3	1·07	81·08	8·69	15·20	12·6	1·10	82·89	8·00	1·81	
,, 4 ..	15·11	12·3	1·19	81·40	9·67	14·56	12·0	1·13	82·41	9·41	1·01	
,, 10 ..	16·46	13·5	1·00	82·01	7·41	15·96	13·3	1·01	83·33	7·52	1·32	Large presses, Willcox defecation.
,, 17 ..	16·44	13·5	1·10	82·11	8·17	15·12	12·6	1·02	83·33	8·09	1·22	Large presses, lime defecation.
,, 17 ..	16·63	13·6	0·96	81·77	7·06	15·67	12·9	0·83	82·32	6·43	0·55	Large presses.
,, 17 ..	16·47	13·5	1·00	81·96	7·40	15·57	12·8	0·89	82·21	6·95	0·25	Large presses, pro rata of sweet H_2O included.
,, 17 ..	16·36	13·6	1·06	83·12	7·79	15·29	12·9	0·94	84·37	7·28	1·25	Large presses.
,, 17 ..	16·36	13·0	0·91	79·46	7 00	15·34	12·2	0·83	79·53	6·80	0·07	Large presses, pro rata of sweet H_2O included.
,, 17 ..	15·90	13·4	0 98	84·27	7·35	14·78	12·5	0·90	84·57	7·20	0·30	Ditto.
Means	16·08	13·1	1·22	81·46	9·31	15·52	12·8	1·16	82·47	9·06	1·01	

(To be continued.)

THE TIMES ON THE INTERNATIONAL SUGAR CONFERENCE.

The Times has not, in the past, been very friendly to the opponents of the bounty system, and, in its criticisms of their action, has not been at all times fair. It is, however, gratifying to note the change of front in the following article, which appeared in its issue of 14th May:—

"On Saturday, (May 12th), the International Conference on Sugar Bounties met for the last time at the Foreign Office, and the final protocol with the draft Convention was signed by the representatives of all the Powers. The draft treaty will be submitted at once to the various Governments concerned, and their decision is expected early in July, so that, unless unexpected difficulties should arise, the plenipotentiaries may reassemble in London not later than the middle of August for the definitive signature of the treaty. Very great credit is due to Baron Henry de Worms, who has had from the beginning the charge of these important negotiations, for the courtesy, the adroitness, and the clear-sighted ability with which he has carried through so far a very delicate and difficult piece of business. This tribute is deserved, whatever may be the ultimate result of the Conference, which depends on many considerations not within the control of the British Government or even of all the contracting parties together.

It remains for the different Governments to carry through their respective Legislatures measures for the enforcement of the principles affirmed in the draft Convention, and until those measures have become law it is impossible to say that any effectual steps have been taken towards the abolition of the obnoxious bounties. Moreover, the Convention in its new form embraces, it is understood, provisions of a somewhat stringent character for bringing pressure to bear on countries that refuse to comply with the system adopted by the contracting Powers. It will be remembered that the Conference originally met in November last, and came to a provisional understanding, embodied in a protocol, just before the close of the year.

The condemnation of the bounty system, in principle, was hearty and unanimous; and this was a great gain. Even in detail the delegates, with the exception of those representing the Belgian Government, were agreed on the means by which the abolition of the bounties could be most effectually and practically carried out. The Belgian delegates, while acknowledging the expediency of putting an end to the bounty system and professing a desire to adopt any practicable measures for attaining that end, raised objections to the proposed plan of compulsory manufacturing and refining sugar in bond, and suggested an alternative scheme involving the reduction of the duty and the fixing of an increased yield from the contract factories. This proposal, however, was regarded as inadequate by the French delegates, and their protest against its acceptance was supported by the representatives of Germany, Austria-Hungary, Russia, Spain, Italy, and Holland. It was necessary to renew the negotiations with a view to overcoming this serious difficulty. Baron de Worms visited the principal European capitals, and the Conference re-assembled a few weeks ago in order to devise means for giving effect to the decision arrived at by the vast majority of the countries producing and manufacturing sugar.

Belgium, as we have seen, proposed to adopt arrangements which the other Powers were unable to accept as satisfactory. The United States were not represented at the Conference by any delegates, though Mr. White, of the American Legation, attended to watch the proceedings. The British Government was pledged to use its influence to obtain the assent and co-operation of the Indian and Colonial Governments. But the difficulties raised by France and supported by almost all the other Powers were very grave. Frenchmen in general, and even those concerned in the French sugar industry, had grown heartily tired of the bounty system and were eager to get rid of it, but they were determined not to surrender what they regarded as an effective weapon so long as other countries retained the power of subjecting them to unfair competition. This view was laid before the Conference on the eve of its suspension in December by the Spanish delegates, who argued that to allow bounty-fed sugars to enter any markets on equal terms with unfavoured sugars was to levy a differential duty against the latter, and contended that the objects of the Convention ought to be enforced either by the imposition of a countervailing duty or by the absolute prohibition of the importation of bounty-fed sugars into the countries acceding to the proposed union.

The question, however, was not then thoroughly discussed, the delegates conceiving it to be outside the scope of their instructions. It has, however, been the principal topic for consideration at the recent meetings; and, as anything like a countervailing duty is admitted to be inconsistent with the scope of English fiscal policy, the alternative of absolute prohibition has received the approval of the delegates. It is not clear that the exclusion of Belgian sugar would necessarily follow from this resolution. The decision whether or not the regulations adopted in each country for the manufacturing and refining of sugar afforded an adequate guarantee against the payment of bounties would naturally be left to an international bureau, and the sugar produced in any country where it was found that no such adequate guarantee was forthcoming would *ipso facto* be excluded from the markets of all the other countries. It is to be presumed that Belgium would not place herself in this invidious and uncomfortable position, especially as she can escape from the necessity of submitting to an inconvenient system by the total abolition of her sugar duties, which bring in only some £240,000 a year. Be that as it may, the demand urged by the French, Spanish, and other Continental Governments, and embodied, it is understood, in the draft Convention, involves the very startling consequence of the possible prohibition of imported sugar from one or more sources of supply, a measure which thoroughgoing freetraders are likely to hold up to scorn as a sign of economical heterodoxy.

Undoubtedly the bounty system, whatever may be said for its advantages by economists reasoning in the abstract, has impressed the working men of the United Kingdom with a keen sense of unfairness. It would not be wise to associate free trade in the minds of the masses with a system by means of which foreign countries are able to destroy isolated branches of English trade, even though it may be, in the long run, to the loss of the foreign taxpayer and for the advantage of the British consumer. Mr. Burt, M.P., and other well-known leaders of the working men have taken an active part in denouncing bounties and in calling upon the Government to adopt such measures as may be necessary to get rid of them. Since the difficulties arising out of the dissent of Belgium from the proposals of the draft Convention have come into view a considerable number of resolutions have been adopted, not only by persons connected with the sugar industry, both employers and employed, but by independent organizations of working men.

The London Trades Council on the 27th March, *adopted a resolution urging the Government to support prohibition as a remedy against States refusing to accede to the Convention, and to take effective measures for abolishing bounties. Similar resolutions recommending either a countervailing duty or the prohibition of bounty-fed imports were passed within the last month or two by a meeting of working men in Liverpool, by a meeting of the same character in Bristol, by the North-East Lancashire Amalgamated Weavers' Association, by a meeting of workmen from the London sugar refineries, by the Operative Cotton Spinners' Provincial Association at Bolton, by the Steam Engine Makers at Manchester, by the Birmingham Trades Council, by the Journeymen Coopers of London, and others. Some of these trades are, no doubt, interested in the success of a policy which, it is hoped, may revive the sugar refining industry in this country; but others are only actuated by the sympathy felt among the working classes generally with the victims of a system that is in itself a gross violation of free trade, whatever may be said of the means by which it is proposed to combat it. In the present case the exclusion of foreign industries which obtain this unfair advantage will not be regarded, perhaps, with any general repugnance; but the ultimate effect of the measure considered as a precedent has to be taken into account. We must acknowledge that, though the prohibition of bounty-fed imports of sugar is not at all as objectionable as the expedient of a countervailing duty, we look upon it with great misgiving, fearing that it will be used to justify much less defensible proposals."

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* For a report of the proceedings of the Conference of the delegates of the Trades' Councils, see the *Sugar Cane* for May, page 266.

The Spectator of May 12th, speaking of the International Sugar Congress says:—

It is semi-officially stated that all the Governments which now grant bounties on the cultivation of sugar have at last agreed to treaties prohibiting the system, which have been found intolerable to their Treasuries. The negotiations have been entirely in the hands of Baron de Worms, and his success is creditable both to his knowledge and his tact. The result will be at first unpopular, as it must involve a rise in the cost of sugar in England, but that will be partly compensated by a restoration of the trade to its natural footing. It has been almost impossible to grow sugar in countries not giving bounties, and the most natural sources of supply were, so to speak, forbidden the market. Their competition, when they are again set free, will keep the price low, and it must be remembered that the bounty money was all extracted from the foreign taxpayer, who became to that extent a poorer customer. The case was, however, we believe, a unique one; at least, we can remember no other foreign law which, while ruining the English producer, directly and most unjustly fattened the English consumer.

A DUTY TO COUNTERVAIL A BOUNTY IS A FREE TRADE MEASURE.

The operation of a foreign bounty is to protect the foreigner on British markets. This, under our free trade system, ought to be most strenuously resisted. The countervailing duty would simply remove the bounty and leave the foreign producer on equal terms with his competitors; it would, therefore, simply restore free trade. All other sugar would come in freely, and, therefore, the natural price of sugar would be in no way disturbed. A duty to countervail a bounty is, therefore, quite consistent with and, in fact, necessary to the maintenance of our commercial policy, which is based on the principle that all producers should be placed on a footing of equality on our markets.

Another operation of the bounty is that natural sources of production are restricted, to the detriment of the consumer. The removal of the bounty relieves the consumer of this hindrance to the progress of natural production, and, therefore, benefits instead of injuring him.

It is further manifest that a duty levied on one particular sugar for the purpose of removing the bounty which it receives, while sugar from all the rest of the world comes in free, is a duty which must necessarily be paid by the producer, not by the consumer. For instance, the total annual importation of sugar into this country amounts to 1,100,000 tons, while the imports from France amount only to 52,000 tons. It is clear that if France alone refuses to abolish bounties, a duty levied to countervail the bounty on French sugar would have to be paid by the French producer out of his bounty, if he desired, as he certainly would, to continue to send sugar to our markets. The only effect that such a duty would have on the price of sugar would, therefore, be that arising from the loss of bounty to the French producer, and the consequent tendency which that loss would have, to restrain the artificial over-production caused by the bounty. But, at the same time, natural sources of production would be relieved from the restraint put upon them by the bounty-fed competition, and would therefore expand to their natural limits *pari passu* with the check put on the unnatural expansion of the bounty-aided production. Though the consumer would lose the artificial and therefore precarious increase of production on the one side, he would have restored to him the natural increase on the other.

At present the consumer is dependent on the success of the beetroot crop. A bad season on the Continent now always causes a great rise in the price of sugar.

SUGAR CANE CULTIVATION IN INDIA.

From the *Indian Agriculturist.*

The usual method of cane culture may be called *broadcast* as opposed to *planting* as the term is understood by European and Australian planters. The difference in results may be approximately obtained by asking any ryot the difference in produce between *cheetwa* and *roop dhan* (broad cast and planted). We had peculiarly favourable opportunities of noting this, having been engaged in sugar cane cultivation at one time in Colombatore and elsewhere. The root of the sugar cane is a small collection of thin fibres or rootlets, there is no tap root. On these depend the health and vigour of the plant with its long succulent stem and succession of long broad leaves; it should, therefore, be placed in the best possible condition to enable it effectually to meet the heavy demand on it.

By the native method, the root is on or near the surface of the ground. The field gets twelve or fourteen surface ploughings, giving a seed bed only four or five inches deep. The little manure, if any given, is scattered irregularly over the surface, a plough goes round the field in a continually decreasing circle, and the cuttings are dropped into shallow-track so made. There may be a little manure where they fall, or there may not be any. The cuttings are covered with about three inches of earth by a piece of wood, drawn over the surface, a man or two standing on it, each supporting himself by holding the tail of the bullock in front of him. This surface covering soon dries; the surface is then loosened a little by the hoe, the roots being carefully avoided. A little manure may now be placed round each plant by hand, and water is let on, till the field is submerged or waterlogged, thus sealing up the roots from air in plastic clay or loam compressed by the downward course of the water and hardening as it dries. As the hoe avoids the roots, the compression of the soil around them increases just where it should be most friable. The hoeing is repeated about three times, followed by a *melwanee* watering, that is, till the ground is waterlogged each time. When the plants reach a certain height, and the leaves begin to shade the field, hoeing is stopped, and as they grow, being close together with no regularity, a thick jungle is the result, excluding sun and free circulation of air. Considering the nature of the plant and the work its root has to do, this treatment of it is most irrational. In Queensland (Australia) and other places where cane cultivation is under European supervision, the cuttings or seedings are laid at least nine inches under the surface of the ground either in carefully made rectangular oblong holes in rows three and a half or four feet apart, or in continuous channels or furrows made by hoe; or double mould-board plough, the bottom being flat, and eight or nine inches wide, that is, wide enough to receive three cuttings placed some distance from each other. A field planted in this way will take as many cuttings as are usually put in by the native method. The space between the rows need not be ploughed, only cleaned of weeds by hoe, these are left on the ground, and are covered by the earth from the channels or holes.

Previous to planting the cuttings, manure in proper quantity is spread over the bottom of the channel and mixed with a little earth. On, or in this, the cuttings are laid end to end either in single, double, or triple rows, as the width of the bottom may allow, and covered by hand with about three inches of earth. The "hole" system is used in Queensland, the ground is hilly and undulating, rain is frequent and each hole retains what may fall into it. In India, where irrigation is necessary, the channel or deep furrow method is best. After some days the surface of the soil in the bottom of the channels is loosened by hand. This may be done by women or children, whereas the hoeing of the ryot's field has to be done by men. If water is now necessary a little is allowed to flow from one end of the channel to the other, and then shut off. As the plants rise, more earth is filled in around them with a little manure where it may be needed; the loosening of the surface, watering and filling in is repeated till the channel is filled; after which, as the plants grow, the earth is drawn from the spaces between the rows and heaped round the roots till a ridge is formed at least nine inches high over the original surface. Subsequent irrigation is given in the hollows between the ridges, the water not being allowed to reach the top of the ridges by four or five inches, which are thus left friable and open for the action of the air and expansion of the roots.

Our ryots have for years seen and acknowledged considerable economy of labour, water, and manure in this method, as compared with their own. They have also seen the common *mongoo* cane of the district so improved that they had to be assured it was nothing else, yet none of them have had the enterprise to adopt it, though several among them have been at work on the cane fields on the West Indies and Mauritius and know the method and its results.

Cane culture should be more of the nature of garden, than field, cultivation, and, if done with a reasonable consideration of the nature and necessities of the plant, a third of the land, now yearly devoted to cane, could be put under other crops with no falling off in the weight of sugar produced.

The industry as a whole, and in its details, from the preparation of the land till the crude produce is ready for the market, is in a very backward and wasteful condition; there is no reason except the inertia of the ryot why this should be so. This might be overcome, and a better rut opened out by some sustained effort on the part of the Government, probably a graduated set of prizes for the best cane fields cultivated with reference to the nature and requirements of the plant. We know by experience the ryots understand what this means, when explained to them in terms with which they are familiar.—*The South of India Observer.*

BARON DE WORMS ON THE SUGAR CONFERENCE.

IMPORTANT DECLARATION.

The delegates to the International Conference on Sugar Bounties were entertained by the Grocers' Company on the 7th of May. The following brief report of the speeches is given in the *Daily Telegraph*:—

The WORSHIPFUL MASTER, in proposing the toast of the evening, said their guests had come to this country, at the invitation of the British Government, to bring about an agreement for the abolition of the bounties on sugar. England had for many years thrown open her ports freely to the industries of foreign nations, and so long as commerce was carried on without artificial favour, so long would our ports be open to the world; but so soon as they found some countries by means of a system of bounties obtaining unfair advantages over us and our own colonies, they asked emphatically whether such a state of things was to continue. (Hear, hear.) There had grown up in England a strong feeling that we could not allow the free importation of bounty produce. The trades unions and the working classes generally appeared to be determined that these bounties should cease. He trusted that the result of the Conference would be the simultaneous abolition of bounties, so that commerce should rest on real, that was to say a reciprocal free trade—open competition and no favour. (Cheers.) With the toast he coupled the names of Baron Henry de Worms and Count Kuefstein.

Baron Henry de Worms, in the course of his reply, said: In tracing the history of this ancient company, your Worshipful Master reminded us that 540 years have passed since it was first called into existence. He told us that its origin was trade, that its object has been trade, and that the result has been the cultivation of prosperous industry. Now, I venture to say if the trade of the Grocers' Company 540 years ago had been hampered and dealt with in such a manner as is one of our industries to-day, he would not have been in the position to congratulate the Grocers' Company upon the prosperity which has attended it during the last 540 years. (Hear, hear.) It is because the British Government are fully convinced that trade, like a tender plant, requires looking after and cultivation, that it has felt it incumbent on them that nothing shall be wanting on their part to bring about some international arrangement which, while not interfering with the trade of foreign countries, shall not press unjustly on the trade of this country. (Cheers.) Much has been spoken—much, perhaps, has been spoken foolishly—with regard to free trade and protection. It may be, and I trust will be, understood that when I speak of protection I do not allude to the trade of the past, but I am speaking of the future. There is protection and protection. There is a protection in a fiscal sense, which has been condemned, and there is protection in a wider sense—a sense which allows nations, as individuals, to protect their industries when their industries are attacked. (Hear, hear.) Now, I am sure that in trade, as in the higher walks of life, there are latent sympathies which only require to be touched to spring into life; and it is the same with nations as with individuals. It is because her Majesty's Government believes this to be true of every Continental Power that they have invited this international conference to meet in London, and I venture to think that that conference will be successful in its results. (Cheers.) The constant intercourse which we have had during the last few months has impressed on the Continent the feeling that commerce is fair and open competition, and that free trade means the opening (as we do) of markets honestly to the commerce of the world; but that it does not mean that we should open our markets freely, as we have done, to a commerce which already derives bounties which we do not possess. I believe as the result of our labours that the year 1888 will see the end of a system which is in defiance of every principle of free trade, and does much to imperil the good relations that should exist amongst the nations of the world, and which I conceive it is the duty of Her Majesty's Government to use every effort to improve. (Cheers.)

Count KUEFSTEIN also responded, and other toasts followed.

THE NATIONAL LABOUR ELECTORAL ASSOCIATION AND THE SUGAR CONFERENCE.

The following letter has been addressed to Lord Salisbury by the British Sugar Refiners' Committee :—

The Most Honourable THE MARQUIS OF SALISBURY, K.G., &c., &c.

My Lord,

As supplementing my letter of the 25th inst., I beg to direct your lordship's attention to an article in the *Leeds Mercury* of the 10th March, being the ninth of a series of articles, entitled "The Programme of the Labour Party, by T. R. Threlfall, secretary of the National Labour Electoral Association." This article is headed "Maintenance of Free Trade and Abolition of State Paid Bounties." The passage to which I desire to refer your lordship is as follows :—

"There is but one effective remedy, and that is total prohibition. If the foreigner, by an unscrupulous device, endeavours to injure our sugar trade by his bounty-fed material, it is at once logical, consistent, and right for this country to say: 'We shall not allow your sugar to be landed; it can only enter our markets on fair and legitimate terms; but we are not going to be parties to your Government taxing their workers 6d. per pound for sugar, in order to subsidize the continental refiners, and enable them to unjustly compete with English sugar manufacturers.' Such an attitude as this would bring the European refiners to their senses; it would strike a fatal blow at bounties; and it would have the immeasurable advantage of being incapable of use by other industries."

I am, my Lord,
Your obedient servant,
GEORGE MARTINEAU.

21, Mincing Lane,
30th April, 1888.

GUY'S CANE MILL.

From the *Queenslander.*

The depressed condition of the sugar industry has not evidently crushed out the energy and inventive powers of the large engineering firms of Europe, for we were last week waited upon by Mr. C. W. Guy, who represents the firm of Messrs. Guy, Deacon and Co., Colonial Engineers, 59 and 60, Chancery Lane, London, W.C. Mr. Guy has for many years been a resident in Java, and connected with its sugar industries. He is the inventor of a new form of crushing roller, several of which will this year be at work in Spain. The lithograph of this invention now before us shows a new construction of sugar-cane mill, which is adapted (in this instance) in conjunction with a second and more powerful set of countergearing to be added to any existing cane crushing mill, which then constitutes a double crushing plant driven by one steam engine, and may be described as follows:—

The existing steam engine and countergearing remain in their present position. The new countergearing is placed alongside the existing one, and connected to it by an ordinary bar and couplings, which drive the pinion. This pinion transmits the power to two spur wheels with shafts and coupling boxes, to one of which is coupled the existing mill, and to the other the patent mill; the former is the preliminary and the latter the final crushing mill.

The construction of the final crushing mill may be thus briefly described. In the same horizontal plane as the main or driving roller, another one is placed; this is the so-called megass roller. These rollers are held together by through bolts, so that all the strain, due to the final pressure, is borne by them. The feed roller is placed below these rollers, and is held in its position to the main roller also by through bolts, so that the strain due to these pressures is borne entirely by them, throwing no strain whatever on the side frames of the mill. From this it will be seen that the relative positions of the rollers are nearly the reverse of the ordinary mill.

A suitable carrier is placed between the two mills; by this arrangement the canes are pressed four times, the first of which most of the juice travels along with the canes, the second of which the juice falls down, whilst the partly crushed canes pass upward, and are then conveyed to the final crushing mill by the carrier, which entering it at an incline, all the juice due to that pressure falls down. At this stage the thrice-crushed canes form a *fibrous* spongy mass, deprived of nearly all juice. The final pressing takes place between the two upper rollers. The direction of exit of the exhausted megass, being vertical, conforms to the law of gravity in allowing the expressed juice falling freely away. Although the relative positions of these rollers are most conducive to complete extraction and prevention of re-absorption of the juice by the megass, still it would not be complete were we to maintain the high speed of the rollers at present universal; besides giving the juice every opportunity of escape, we must also give the cane *sufficient time*, under each pressure, to allow of perfect separation, without the opportunity of re-absorption. This is effected by the addition of the second set of countergearing, which, whilst reducing the speed of the rollers to practical limits, still allows the same quantity of canes to be ground per day, with a corresponding higher efficiency of juice extraction; the resultant megass is not lacerated and can be better utilised as fuel than from any other method.

Mr. Guy is now on a tour through the various sugar-growing districts of Queensland.

TRADE IN TRINIDAD IN 1887.

The following particulars of the trade of Trinidad during the year 1887 are extracted from a report by Mr. H. J. Clark, Government Statistician at the Port of Spain, dated the 13th April last:—

"The returns for 1887 show the following totals:—Imports, £1,918,670; exports, £1,870,612; total, £3,789,282—as against the following totals for 1886:—Imports, £2,503,514; exports, £2,509,140; total, £5,012,654, or a falling off of over one million and a quarter sterling. This is, however, entirely due to the almost entire cessation of the transit shipments of gold from the mines of Venezuelan Guiana. The greater part of this bullion, which formerly passed in transit through this Colony, swelling the totals of both its imports and exports, is now, owing to new fiscal regulations in Venezuela, sent on to Caracas. It is also said that the output at the various mines has been considerably less in 1887 than it was in 1886. In any case the transit of bullion through this Colony has fallen off enormously, as the following figures show:—

"Imports: bullion, £852,324 in 1886, and £172,615 in 1887;

specie, £107,683 in 1886, and £99,026 in 1887; total, £960,007 in 1886, and £271,641 in 1887.

"Exports: bullion, £852,492 in 1886, and £170,915 in 1887; specie, £96,312 in 1886, and £45,428 in 1887; total, £948,804 in 1886, and £216,343 in 1887, or a falling off of £1,420,827, or more than the total deficit, thus proving an increase under other heads.

"Excluding bullion and specie, the totals are as follows:—Imports: general, £1,543,507 in 1886, and £1,646,729 in 1887; exports: general, £1,560,336 in 1886, and £1,654,269 in 1887; total, £3,103,843 in 1886, and £3,300,998 in 1887, thus showing an increase in the total general trade of the Colony of, as nearly as possible, £200,000, about equally divided between imports and exports.

"In imports the principal increase—£114,000—is in goods from the United Kingdom; Spain comes next with an increase of £9,500; then the United States with one of £8,500, and Germany, £850. The chief decreases are British Colonies, £13,000; Venezuela, £10,000; France, £4,000.

"In exports the chief increases are £88,000 in shipments to the United States, £79,000 in those to the United Kingdom, £34,000 to Venezuela, and £12,500 to Germany. The chief decreases are France, £78,700; French West Indies, £24,500; and British Colonies, £10,000.

"I would call particular attention to our improved trade with the mother country during the past year. This trade had been steadily decreasing for some years past, having fallen from £1,918,182 in 1879 to £1,087,655 in 1886, but last year shows a total trade of £1,281,340, or a recovery in one year of 17½ per cent. from the lowest point. From this it may be hoped that the turning-point has at length been reached, and that with the abolition of the sugar bounties in the near future, and the impetus to trade which such a step is sure to give, our trade with the mother country may soon assume its former proportions.

"The exports of native produce for 1886 and 1887 were as follows:—Sugar, 48,449 tons in 1886, and 66,875 tons in 1887; molasses, 2,220,228 galls. in 1886, and 2,542,225 galls. in 1887; rum, 16,181 galls. in 1886, and 35,571 galls. in 1887; asphalt, raw, 30,255 tons in 1886, and 35,072 tons in 1887; asphalt, epurée, 5,416 tons in 1886, and 8,026 tons in 1887; cocoa, 17,913,037 lbs. in 1886, and 11,927,067 lbs. in 1887; coffee, 20,052 lbs. in 1886, and 8,380 lbs. in 1887; cocoanuts, 9,103,200 in 1886, and 7,365,295 in 1887; bitters, 35,355 galls. in 1886, and 35,143 galls. in 1887. The value of the native produce exported was £1,398,610 in 1887, as against £1,291,962 in 1886.

"Shipping.—The total tonnage entered and cleared from the ports of the Colony in 1887 is again in advance of former years, the figures for the past four years having been as follows:—1,048,959 tons in 1884; 1,069,121 tons in 1885; 1,196,076 tons in 1886; and 1,253,599 tons in 1887.

"The steady advance of the Colony during the past year, as shown in the foregoing figures from the trade and shipping returns, is further corroborated by an increased revenue, an increased balance to the credit of the Colony, and an increase during the year of over 12½ per cent. in savings banks deposits."

IMPORTATION OF SACCHARINE INTO FRANCE.

The following is a translation of a circular, under date of the 28th March last, addressed by the French Director-General of Customs to the heads of French Customs Houses, calling their attention to the importation of the new chemical product called saccharine:—

"A new chemical product, derived from coal tar, and which has received the name of saccharine, has made its appearance in the commercial world. Although not possessing the elementary composition of vegetable sugars, this substance has a sweet flavour, sensibly exceeding in intensity that of sugar properly so-called. The high price (about 130 fr. per kilog.) at which saccharine is at present sold, would appear to militate against the development of its consumption, if not for certain special uses. Be that as it may, the Administration, desiring to follow the movement of the importation of saccharine, either pure or in a mixed state, I request you to invite the service to take note of the quantities which shall henceforth be introduced. You should inform me of these introductions, and forward me particulars which you may be able to gather of the use of the product, its value, &c.

"I may add that saccharine is admissable free of duty, as coming under the category of 'chemical products derived from coal tar.'"

Appended to the above circular was a copy of a letter addressed on the 20th February last by the Director-General of Indirect Taxes to the various agents, calling their attention to the subject of the introduction of saccharine into commerce, and requesting to be informed of any facts which would lead to the supposition that saccharine has been used in the place of ordinary sugar, with a view to its taxation in the event of such an employment.

PROPOSED SUGAR PLANTATION, HAWAIIAN ISLANDS.

On the lee side of the Island of Kauai, between the Waimea and Hanapepe rivers, lies the plain of Makaweli, some three or four miles in extent, composed of deep, rich volcanic soil, but so dry that grass and shrubs grow on the lower part only during the wet season. On either side flows a stream, pouring its waters into the sea. How to bring this water on to the plain has been a problem with many who have ridden over it. Surveys have been made in former years by Messrs. Houseman, Rowell and Wilcox, and the project decided to be feasible, but at an enormous outlay of capital, too large for any one person to undertake.

Recently Mr. Wm. R. Watson, of the firm of Mirrlees, Watson and Co., of Glasgow, Scotland, visited the district, and after thoroughly investigating the location, with its abundant streams on each side of the plain, has decided to take hold of it, if, after a survey is made, the bringing of the streams on to the plain is found to be practicable and within the limits of estimated cost. With this in view, he has secured from Messrs. Gay and Robinson the option of leasing 5,000 acres more or less, of cane land at Makaweli, Kauai, for thirty-five years, and of taking water for irrigating and fluming purposes from the Koula (Hanapepe) and Makaweli streams, for the purpose of establishing an extensive sugar estate. The principal condition of the lease is the payment, as rent, of one-sixteenth of all sugars made by the company (to be formed) save what may be grown on 600 acres of these lands on which the present proprietors, G. and R. reserve the option of planting and cutting up to 300 acres yearly, they getting nine-sixteenths, and the company seven-sixteenths of the sugars. The company to haul the G. and R. cane but to pay no sixteenth of sugars made from said cane.

This enterprise, if carried out will necessitate the expenditure of five hundred thousand dollars, in bringing the water on to the land, and for the erection of the mills and buildings to carry on the work. With an abundance of water for irrigation, there is probably no other spot on this group that can give the same promise of becoming a sure and permanent sugar producing enterprise. Lying on the lee side of the island, sheltered from the harsh trade winds, here is a tract of ten square miles of deep, virgin, volcanic soil, waiting only for the steam plough to break it up, with a gradual slope towards the smooth sea, where can be made excellent shipping piers—it certainly has everything in its favour. The Kekaha plantation, a few miles distant, on the west side of the Waimea river, is noted for its extraordinary sugar yield—from five to seven tons of sugar to the acre. But the area of sugar land at Kekaha is limited to a narrow belt, while Makaweli offers from six to ten thousand acres, though at present it is not certain that more than five or six thousand acres can be irrigated.

This plantation will be carried on by a company to embrace local capitalists, as well as the firm named above.—*The Planters' Monthly.*

NOTES ON BOOKS.

THE CARIBBEAN CONFEDERATION. With a Map. A Plan for the Union of the Fifteen British West Indian Colonies, preceded by an Account of the Past and Present Condition of the Europeans and the African Races inhabiting them, with a True Explanation of the Haytian Mystery, in which is embodied a Refutation of the Chief Statements made by Mr. Froude in his recent work, "The English in the West Indies." By G. S. Salmon, late President of Nevis, &c. Cassell & Co. (1s. 6d.) 1888.

We are glad to see this work of Mr. Salmon's. It was needed; for it was necessary that the fallacies which run through Mr. Froude's "English in the West Indies" should be refuted, and by one who, from having resided in the West Indies, is able to speak with some authority upon the subject upon which he writes.

Mr. Salmon divides his work into twelve chapters, as under:—

I.—Mr. Froude's Book, "The English in the West Indies."
II.—What constitutes Superiority of Race.
III.—The African as he is in Africa.
IV.—The English in the West Indies.
V.—The Africans in the West Indies: The British Black Man.
VI.—Emancipation not Freedom.
VII.—Labour.
VIII.—Taxation.
IX.—The Foreign West Indies; The Haytian Mystery Explained.
X.—Religion and Education.
XI.—Local Self-Government.
XII.—The Caribbean Confederation.

The headings of these 12 Chapters will give our readers some idea of the scope of the book.

Mr. Froude's "English in the West Indies" has been read by a large circle of readers, and by many we doubt not laid down with feelings of disappointment; for in this work Mr. Froude descends from the platform of the historian to the level of the partisan.

Of the fifteen islands of the West Indies, Mr. Froude visited but four, where he remained altogether only a few weeks, and landed for a few hours at two other islands.

Mr. Froude's descriptions of the places he saw are often graphic and eloquent, but for an impartial picture of the people, the reader will find very little worth taking home. The book abounds in contradictions; opinions given in one page, are not unfrequently refuted by facts which he incidentally relates later on.

His remarks on the religious aspect of the West Indies are not in good taste, and must have given pain to very many. Mr. Salmon gives a separate chapter to this subject, and convincingly shows how groundless Mr. Froude's aspersions and inuendos are; and asks what can have been Mr. Froude's object in writing this book? a question which many others will have put to themselves.

Mr. Salmon criticizes unsparingly—but we cannot say unjustly—many of Mr. Froude's statements. We have marked a great number of passages, but can only find room for a few of them.

At page 26 of Froude's work, it says:—

"Oratory is the spendthrift sister of the arts, which decks itself like a strumpet with the tags and ornaments which it steals from real superiority. The object of it is not truth, but anything which it can make appear truth; anything which it can persuade people to believe by calling in their passions to obscure their intelligence."

One naturally asks oneself, what is the moral difference between spoken and written words?

At page 174, Mr. Froude says:—

"Am I asked what should be done? I have answered already. Among the silent thousands whose quiet work keeps the empire alive, find a Rajah Brooke if you can, or a Mr. Smith of Scilly. If none of these are attainable, even a Sancho Panza would do. Send him out with no more instructions than the knight of La Mancha gave Sancho—to fear God and to do his duty."

And yet, in speaking of Barbados (page 103), he says:—

"The Governor of Barbados is not despotic. He controls the administration, but there is a constitution as old as the Stuarts; an assembly of thirty-three members, nine of whom the Crown nominates, the rest are elected. The friction is not so violent as when the number of the nominated and elected members is equal."

Upon which Mr. Salmon observes:—

"Here we see the working of a real constitutional system—for Barbados differing from every other West Indian Island, is almost an entirely self-governing colony—and the result is the most English, the most enlightened, the most advanced, and, on the whole, the most prosperous of the British West Indies. It is not difficult to vituperate liberty in every other West Indian island, for none of its influences ever passed over any one of them. Unalloyed personal rule has been their lot ever; liberty need not defend itself from Mr. Froude's attacks here; it could never have done any harm where it never existed. But Mr. Froude cannot see even this old Barbadian constitution, dating from the Stuarts, and which has helped to make Barbados rise so conspicuously above its neighbours, without giving it a kick; he says: 'The system may have worked tolerably without producing any violent mischief.' But Mr. Froude must also be inaccurate; he continues: 'There have been recent modifications, however, pointing in the same direction as those which have been made in Jamaica. By an ordinance from home the suffrage has been widely extended, obviously as a step to larger intended changes." In the direction of Jamaica! But the suffrage and constitution of Barbados have always been more liberal than in Jamaica, and the 'ordinances from home' have all to be passed by the local assemblies before being approved of by the Secretary of State. The 'widely extended suffrage' of Barbados dates from before the recent Jamaican constitution, and was in advance of it in every way. There are 4,200 electors in a population of 180,000 in Barbados to 9,298 electors to a population of 620,000 in Jamaica. This Barbadian suffrage would only alarm a Mr. Froude."

Mr. Froude thinks the East Indian administrative system, if applied to our West Indian Colonies, would bring about the much-needed change.

In reference to which Mr. Salmon says:—

"Mr. Froude may think so, and some very few others with him, but there is no analogy between the East and West Indies to argue on. No two places could be more wide apart. Everything is here that makes for difference. An argument on this basis must resolve itself into mere personal opinions. The East Indian form of government may be as admirable in its place as Mr. Froude deems it to be. But it is very un-English, and it is wholly unsuited to a colony or to the West Indies, just as the present system of irresponsible bureaucratic rule is unsuited. No body of whites of English, or any other, nationality would consent to settle and make their homes in a country so ruled. The Europeans in the East Indies are a mere drop in that great ocean of humanity, and if one may judge from their expressed sentiments, not one of them ever went there to enjoy the 'admirable' rule.

"Let us be honest. If Englishmen really wish to settle in the West Indies, what is it that hinders them from going there? Some fear the climate. Then the statements we so often hear about the nature and character of the inhabitants must deter many from making their homes among them. There is no greater enemy of these British possessions than he who spreads abroad statements which bring into unpleasant prominence the vices and weaknesses of the blacks. This, however, would right itself in time, for the good qualities of these people would also leak out eventually, and fairly-minded men would strike a balance, and find out that, after all had been said for and against them, they were no worse than average humanity. But the blacks are saddled with evil qualities and vices they never possessed. Among the detractors of the great African section of the human family Mr. Froude can head the list. With good-natured contempt he allows them those qualities which cannot be disassociated from a powerful and even splendid physique, but he will scarcely allow they are themselves entitled to use these qualities. He allows them nothing else. If the West Indian whites are satisfied with Mr. Froude's general estimate of them, no one else has any right to complain. He has painted them in their homes with a master-hand. We see them vividly before us with their regrets, their hopes, their aims. We see what they have been; we see what they would wish to be. We see the West Indies of the old days; we see what Mr. Froude's whites would like them to be in the future. If all these pictures can attract a single colonist from Great Britain, it will not be the vigorous, the enterprising, or the manly. But if man be unattractive, nature is great. The physical splendour of these islands and the teeming wealth of their soil, so eloquently set forth for us by Mr. Froude, may overcome some natural repugnance to the people which the perusal of his work cannot fail to engender. The ruin of the resident English families in the West Indies is often referred to by Mr. Froude, but he evidently has no knowledge of the chief causes of this ruin. Those he assigns are inadequate altogether. If a fall in the price of a produce or a cereal could permanently ruin landlords, the race would have become extinct long ago all over the world. They suffer losses—may be severe losses—at times, and during depressions, and some may become bankrupt. But this no more kills them off as a body in a state than merchants, manufacturers, and traders get killed off by losses and bad times. They suffer as other people do, and no more.

"But there were subtle causes at work in the West Indies which more surely sapped the prosperity of the whites than anything Mr. Froude has brought forward. Barbados was exempted from the infliction, and we see the result to-day in its favour.

Mr. Salmon then refers to the ill effects of the operation of the Encumbered Estates Courts Act for the West Indies, which was abolished about two years ago:—

"The Encumbered Estates Court Act for the West Indies was passed in 1854, and it was left optional with the islands to avail themselves of its provisions or not. The intention of the Act being to obtain a cheap and ready method for disposing of encumbered estates, most of the then local governments accepted it.

"Now for the result. It is almost incredible, but nevertheless true. The action of the court from the commencement was opposed to the spirit and intention of its promoters. This is how it was worked. An owner of a property valued at say £10,000 gets some one to advance him money, say £2,000, to put up buildings and machinery, or otherwise work it more profitably, and he gives a regular mortgage on the property as security. Such a proceeding would not be uncommon anywhere. The English merchant in England who buys and sells the produce raised on this property, also supplies the owner and the estate with its various requirements. In course of time, by bad management of the owner, the estate comes to be indebted to the merchant, say for £5,000 or 6,000. This merchant is aware from the beginning that there is a mortgage prior to his claims on the properties for moneys advanced. This merchant, nevertheless, can carry his claim before the Encumbered Estates Court sitting in London and demands that the property be sold. The sale takes place, and there are few to bid. The estate realises about £6,000. Perhaps the merchant himself buys it. The court pays the merchant the whole of his claim, and the original mortgagee gets nothing. This is called the method of the 'consignee's lien.'"

* * * * * * *

"For thirty years and more this court operated in these unfortunate islands, driving away capital and enterprise, except such as the close corporation of British West Indian merchants chose to advance. These merchants, having thus the game in their hands, had the proprietors at their mercy. These latter were obliged to ship all their produce to their consignees, even if better prices were ruling in the West Indian ports than in London. They had to use the ships of the consignees on these latter's own terms. They had to accept the prices the consignees sold for. They had to grow the produce the consignees preferred to deal in. The consignees discouraged the growth of every produce but sugar.

"No business man can doubt that such a phenomenally stupid, disastrous, and iniquitous law, after being in operation for so many years, must have left its mark, and destroyed thousands of the homes of the old English settlers."

Mr. Froude does not disguise his antipathy to the negro. Mr. Salmon gives two extracts (page 161)—

"The poor black was a faithful servant as long as he was a slave. As a freeman he is conscious of his inferiority at the bottom of his heart, and would attach himself to a rational white employer with at least as much fidelity as a spaniel. Like a spaniel, too, if he is denied the chance of developing under guidance the better qualities which are in him, he will drift back into a mangy cur."

And again (page 348)—

"In the English islands they are innocently happy in the unconsciousness of the obligations of morality. They eat, drink, sleep and smoke, and do the least in the way of work that they can. They have no ideas of duty, and therefore are not made uneasy by neglecting it. One or other of them occasionally rises in the legal or other profession, but there is no sign, not the slightest, that the generality of the race are improving either in intelligence or moral habits; all the evidence is the other way."

Referring to which, Mr. Salmon says:—

"In these two typical passages—there are numerous others of a similar nature throughout the book—Mr. Froude shows his aims; he is not only attacking the black men, he attacks also the Government for having liberated them from bondage. The Africans in the West Indies were improving while in slavery, according to him, but have lost ground since. This is the moral of Mr. Froude's fable—liberty is always bad. We all know what the African slave was in the West Indies and how he was treated, and the subject need not be gone into here; something will be said about it, however, in the chapter 'Emancipation not Freedom.'

"Englishmen who have forgotten all about the old horrors and abominations of slavery, and perhaps have never heard how the masters and mistresses were even more defiled by them than the people they held in bondage, may be unconsciously led into error by reading Mr. Froude's book. It will be proper, therefore, to bring forward some testimony of crushing weight to prove for the thousandth time, not only the falseness and unjustness of the charges of Mr. Froude, but their absurdity.

"We noticed everywhere signs of increasing popular prosperity, particularly in the generally acknowledged fact that the peasantry are better clothed and better housed than formerly. For instance, negro dwellings are now commonly roofed with shingles, and are generally in sound condition, a state of things said to be quite unknown twenty years ago. Instances were brought to our knowledge in which negro labourers had recently purchased land in small building plots at rates from £30 to £40 an acre."

Mr. Salmon relates an anecdote of Sir Anthony Musgrave, at a meeting of the Colonial Institute to hear a paper by Mr. Morris on "Planting Enterprises of the West Indies," in June, 1883. During the discussion, Sir Anthony, who was then Governor of Jamaica, and present at the meeting, was asked if he could throw any light as to what the people (meaning the black population) were doing. He replied, "I would say they were occupied in paying a greater part of the taxes."

These are the people, adds Mr. Salmon, whom Mr. Froude would have us believe are only fitted at best for a modified condition of slavery.

Our space forbids us giving other extracts. Those who have read Mr. Froude's work ought to get Mr. Salmon's book, if they desire to learn the truth respecting the social and economical condition of the West Indies.

THE DIRECT PRODUCTION OF PURE HOT AIR FROM COAL.

A discovery having an important bearing in the present upon the arts and manufactures, which may in the future aid in rendering the atmosphere of towns and cities purer than it now is, has recently been made by Mr. William A. Gibbs, of Gillwell Park, Chingford, Essex. The discovery is that perfectly pure air can be produced from the combustion of coal, and this discovery is mainly due to the circumstance that the production of air under such conditions was a desideratum, necessity once more asserting herself as the mother of invention. Mr. Gibbs is well known as having done so much for agriculturists by means of his harvest-saving appliances, and still more lately for tea-planters by his tea-drying apparatus, all of which inventions have been described by us. Now tea-drying requires hot air, and to produce this coke has hitherto been used, the deleterious vapours from which, of course, found their way into the atmosphere of the tea-drying houses in which Mr. Gibbs' apparatus is employed. It was the desire of a number of tea-planters in India who have for many years past adopted his process that Mr. Gibbs should endeavour, if possible, to procure by simple means perfectly pure and innocuous hot air from the native coal recently discovered in Assam and from the waste wood abounding in other parts of India. Mr. Gibbs accepted the challenge, and during the past year has given his undivided attention to the task thus set before him. The outcome of his investigations and experiments is a system of producing perfectly pure hot air direct from burning coal on a practical working scale. This we recently saw in operation at Chingford. It will be unnecessary to describe the various processes, involving complex and costly mechanical arrangements, by means of which Mr. Gibbs arrived at the final results. Suffice it to say that step by step he cleared away each difficulty, now chemical, now mechanical, until at length he has placed within the reach of the planter a simple and inexpensive mode of obtaining from coal or wood, or both, an air so pure that it can be inhaled without injury or inconvenience, and is therefore suitable for application to the most delicately flavoured tea or other produce without the possibility of a taint.

The arrangement for effecting this result is extremely simple. It consists of a brick chamber, about 5ft. long by 2ft. wide and 2ft. high, built upon the ground. At one end is a feed chamber and a fuel chamber, and at the other a powerful exhaust and blast fan. Placed intermediately between the chamber and the fan are baffle plates, splitting plates, a standing bridge with perforations at the back, and a hanging bridge with perforations at the front. There are also several carefully proportioned inlets to supply the exact quantity of air requisite for perfect combustion. This exact apportionment of the air constitutes one of the main points of success, and it is the one which Mr. Gibbs found the most difficult to determine. Once known, however, this law of proportion between air and fire is, of course, easily maintained. Another point having a very important bearing on the result is the exact relative proportion of the fuel chamber to the feed chamber and of both to the volume of air drawn per minute by the fan. This also being ascertained, after many failures, is now a fixed instead of a doubtful quantity. Given these proportions, and some others of minor importance, the result is distinctly curious. Issuing from a fan-mouth 12in. in diameter comes rushing a column of hot air, marking on the pyrometer at its exit a steady uniform temperature of 500° Fahr. Not a trace of smoke or fume is visible to the eye; not a taint of any kind is perceptible to the taste or smell. Standing, as we did, in the range of this simoom, with the hot blast full in the face, the heat is, of course, excessive, but the stream of air is perfectly pure. Save in the matter of temperature, it affects neither the eyes, the throat, nor the nostrils. As a proof of this purity, some choice tea which had been saturated with hot water, was placed in the hot air current, and when re-dried was pronounced by an expert to be wholly free from any imparted taint or taste.

In order to show the character of the products of combustion before being submitted to the fiery ordeal the fan was stopped, and a dense cloud of thick smoke rose up from the coal in the feed chamber, charged with suffocating fumes. On re-starting the fan it was quietly drawn in again, but not a sign of it appeared at the exit from the fan, and the air, when inhaled, was as pure as ever. It would be interesting to know the *rationale* of the process by means of which all the varied products from coal combustion are thus so completely destroyed. Mr. Gibbs suggests that the water contained in the coal is decomposed into oxygen and hydrogen, and that the hydrogen in burning adds to the heat of the resultant air, while the oxygen, reinforced as it is by that obtained from the large volume of fresh air admitted at the various inlets, decomposes and purifies all these products. But, whatever the theory may be, the fact remains that it is not only possible, but easy and economical to obtain the utmost amount of heat from coal without any deterioration of the atmosphere. The success attained by Mr. Gibbs naturally suggests the application of the principle in many important directions in connection with the industrial arts, as well as for steam-raising purposes and for domestic use by the supercession of open fires in stoves.—*The Times.*

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, May 17th, 1888.

FAIR REFINING.	96o/o CENTFS.	GRANULATED.	STAND. A.	STOCK IN FOUR PORTS.
May 17, 1888.—4¾c.	5½c.	6¾c.	6 3-16-¼c.	Jan. 1, 1888— 47,798 tons.
May 19, 1887.—4 7-16c.	5⅛c.	5 11-16-¾c	5 5-16c.	Jan. 1, 1887—102,279 tons.
May 20, 1886.—4⅞c.	5⅝c.	6¼-5-16c.	5⅞c.	Jan. 1, 1886— 57,328 tons.
May 21, 1885.—5⅛c.	5 15-16c.	6¾c.	6¼c.	Jan. 1, 1885— 89,186 tons.
May 15, 1884.—5 5-16c.	6⅛c.	7 1-16c.	6½c.	Jan. 1, 1884— 60,900 tons.
May 17, 1883.—7⅛c.	7¾c.	8 13-16c.	8⅜c.	Jan. 1, 1883— 50,297 tons.
May 18, 1882.—7⅝c.	8 3-16c.	9¾-⅞c.	9 5-16-⅜c.	Jan. 1, 1882— 43,927 tons.
May 19, 1881.—7 7-16c.	8¼c.	10c.	9½c.	Jan. 1, 1881— 66,999 tons.
May 13, 1880.—7 9-16c.	8 9-16c.	9⅜-½c.	8⅛-¼c.	Jan. 1, 1880— 63,558 tons.
May 15, 1879.—6 5-16c.	7 3-32c.	8⅝c.	7⅞-8c.	Jan. 1, 1879— 50,773 tons.
May 16, 1878.—7⅜c.	8c.	9½c.	9-9⅛c.	Jan. 1, 1878— 48,230 tons.
May 17, 1877.—10c.	11c.	12½c.	11¾-⅞c.	Jan. 1, 1877— 25,885 tons.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

January 1st to April 30th, 1887-1888.

Board of Trade Returns.

IMPORTS.

Raw Sugars.	Quantities.		Value.	
	1887.	1888.	1887.	1888.
	Cwts.	Cwts.	£	£
Germany	2,515,153	905,242	1,357,313	644,795
Holland	128,273	70,526	70,172	48,863
Belgium	385,635	322,808	197,441	214,618
France	6,993	1,179	4,109	1,149
British West Indies & Guiana	926,948	802,952	681,221	674,624
British East Indies	66,021	177,412	29,105	89,615
China and Hong Kong	112	....	81	....
Mauritius	33,240	57,061	15,860	39,294
Spanish West India Islands	....	246,704	....	182,295
Brazil	288,153	1,338,236	150,978	855,317
Java	1,336,748	1,752,953	892,194	1,362,666
Philippine Islands	57,744	116,553	26,059	57,609
Peru	139,002	208,989	85,849	158,678
Other Countries	197,657	198,767	113,955	142,507
Total of Raw Sugars	6,081,679	6,199,382	3,624,337	4,472,030
Molasses	66,307	78,476	21,266	26,242
Total Sugar and Molasses	....	....	3,645,603	4,498,272
Refined Sugars.				
Germany	956,755	945,420	735,346	827,989
Holland	438,921	380,202	341,794	353,528
Belgium	54,094	79,950	44,907	76,516
France	467,768	289,899	349,200	265,163
United States	356,166	10,699	286,179	9,005
Other Countries	64	192,379*	37	150,706*
Total of Refined	2,273,768	1,898,549	1,757,463	1,682,907

EXPORTS.—Refined Sugars.

	Cwts.	Cwts.	£	£
Sweden and Norway	20,514	17,716	13,695	15,137
Denmark	34,778	21,193	18,775	15,383
Holland	19,389	26,781	12,604	19,983
Belgium	17,199	8,293	10,499	6,324
France	17,649	2,276	10,762	1,645
Portugal, Azores, & Madeira	39,336	30,564	22,130	22,756
Italy	32,256	23,529	19,277	17,607
Other Countries	69,290	57,520	45,030	47,271
Total of Refined	250,411	187,872	152,772	146,106

* Imported entirely from Russia.

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of April, 1888, compared with the corresponding month of the two preceding years, and the average monthly imports for the year compared with those of 1885, 1886, and 1887, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

Countries from which Sugar has been imported.	"Lumps and Loaves."							"Other Sorts." Including Crushed Loaf, Granulated, Crystallized, &c.							Total.						
	Monthly Average.				Apl.	Apl.	Apl.	Monthly Average.				Apl.	Apl.	Apl.	Monthly Average.				Apl.	Apl.	Apl.
	1885	1886	1887	1888	1886	1887	1888	1885	1886	1887	1888	1886	1887	1888	1885	1886	1887	1888	1886	1887	1888
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
France..............	1597	1462	1363	1891	1146	1586	1705	463	2688	5099	1733	816	5853	2387	2060	4150	6462	3624	1962	7439	4092
Holland	3848	3508	3780	2241	3457	3414	2773	1472	1428	2483	2511	1022	1881	2102	5320	4936	6263	4752	4479	5295	4875
Germany & Austria ..	808	990	1347	1475	558	2811	1686	3262	6634	10463	10343	7783	16789	18482	4070	7624	11810	11818	8341	19600	20168
Belgium	189	344	592	742	442	548	491	120	113	308	257	124	306	150	309	457	900	999	566	854	641
United States	707	854	454	6	662	408	..	8869	5078	2804	128	4475	8110	301	9576	5932	3258	134	5137	8518	301
Russia..............	..	..	3	..	..	..	..	875	3412	452	2405	4375	..	5271	875	3412	455	2405	4375	..	5271
Other Countries	1	..	..	..	1	..	..	24	9	15	..	..	..	..	25	9	15	..	1	..	..
Total	7150	7158	7539	6355	6266	8767	6655	15085	19362	21624	17377	18595	32939	28693	22235	26520	29163	23732	24861	41706	35348

SUGAR STATISTICS—GREAT BRITAIN.

TO MAY 26TH, 1888 AND 1887. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1888.	1887.	1888.	1887.	1888.	1887.
London	62	76	107	131	114	131
Liverpool ..	132	86	111	104	160	114
Bristol	5	4	20	26	21	25
Clyde	47	51	92	91	96	107
Total ..	246	217	330	352	391	377
	Increase..	29	Decrease..	22	Increase..	14

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND. FOR APRIL, 1888 AND 1887.

	STOCKS. May 1st.		DELIVERIES. In April.		IMPORTS. In April.	
	1888.	1887.	1888.	1887.	1888.	1887.
New York	100	93	53	99	71	123
Boston	10	17	21	23	22	27
Philadelphia....	5	1	15	15	15	15
Baltimore	..	..	..	..	..	..
Total......	115	111	89	137	108	165
	Increase..	4	Decrease..	48	Decrease ..	57
Total for the year..			309	407	376	413

Stocks of Sugar in the Chief Markets of Europe on the 30th April, for Three Years, in thousands of tons, to the nearest thousand.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts.*	Total 1888.	Total 1887.	Total 1886.
231	*182	15	*185	*98	19	730	774	884

*Estimated.

Consumption of Sugar in Europe for Three Years, ending 30th April, in thousands of tons, to the nearest thousand.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts.*	Total 1888.	Total 1887.	Total 1886.
1212	390	46	436	210	337	2631	2692	2498

Estimated Crop of Beet Root Sugar on the Continent of Europe for the present Campaign, compared with the actual crop, of the three previous Campaigns.

(From Licht's Monthly Circular.)

	1888-89. Tons.	1887-88. Tons.	1886-87. Tons.	1885-86. Tons.
France..........	425,000 ..	405,000 ..	486,483 ..	298,407
German Empire ..	970,000 ..	925,000	1,018,842 ..	838,131
Austro-Hungary..	480,000 ..	412,500 ..	523,060 ..	377,032
Russia and Poland.	440,000 ..	430,000 ..	479,582 ..	537,860
Belgium	155,000 ..	135,000 ..	132,570 ..	88,421
Holland	42,000 ..	36,000 ..	32,263 ..	21,244
Other Countries..	62,500 ..	56,050 ..	56,050 ..	55,500
Total....	*2,575,000	2,399,550	2,728,810	2,216,595

* This estimate is based upon last year's yield--if based upon an average yield. Mr. Licht makes the total to be 2,800,000 tons, or 225,000 tons more, see page 290.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

The sugar market during the past month has shown but little variation in values; what there has been, has been slightly in favour of buyers. Opinions differ greatly as to the probable future of prices—much will depend upon the weather during the next five weeks in Germany and France; as an indication of its importance, Mr. Licht gives two estimates for next crop; one based upon an average yield, and one upon last year's yield, and the totals of the two calculations show a difference of 225,000 tons. (See page 290.)

There are few, even amongst those who adhere rigidly to hand and mouth buying, but look upon present values as safe; and with the preserving season close upon us, there will soon be a decidedly improved demand, especially for cane sugars, with firmer prices.

The imports of foreign and refined for April were 41,706 tons, against 35,348 tons for April, 1887; and for the four months, they amount to 94,928 tons, against 113,684 tons last year.

The deliveries this year, up to May 26th, into the United Kingdom (four principal ports) are less by 22,465 tons than for the same period of 1887, whilst the imports show an increase of 13,486 tons. The imports into London, the Clyde, and Bristol have fallen off 16,000 tons, 11,000 tons, and 5,000 tons respectively, whilst the imports into Liverpool have increased by nearly 46,000 tons.

The stocks in the United Kingdom, on May 26th, were 246,298 tons, against 216,792 tons in 1887, being an increase of 29,506 tons.

	Floating.		Last Month.
Porto Rico, fair to good Refining	13/3 to 13/9	against	13/6 to 14/-.
Cuba Centrifugals, 96°/ₒ polarization	15/-	,,	14/6 to 15/-.
Cuba Muscovados, fair to good Refining	13/3 to 13/9	,,	13/6 to 14/-.
Java, No. 15 to 16, good to strong	15/3 to 15/9	,,	15/6 to 15/9.
	Landed.		Last Month.
Madras Cane Jaggery	9/- to 9/6	against	9/- to 9/6.
Manila Cebu and Ilo Ilo	9/- to 9/6	,,	9/- to 10/-.
Paris Loaves, f.o.b.	17/3 to 17/9	against	17/6 to 17/9.
Titlers	19/3	,,	19/6
Tate's Cubes	20/6	,,	20/9
Austrian-German Beetroot, 88°/ₒ f.o.b.	13/1½ to 13/3	,,	13/4½ to 13/6.

THE
SUGAR CANE.

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☞ The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to Henry Thorp, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see page iii.

Argentine Republic Parcel Post.—Parcels not exceeding 7 lbs. in weight will now be received at any Post Office in the United Kingdom for transmission to the Argentine Republic and Chili, *via* Germany. Parcels for the Argentine Republic and Chili, will be included in the mails for Hamburg despatched from London every Wednesday, Thursday, and Saturday morning. From Hamburg, parcel mails are despatched to the Argentine Republic every Thursday, and to Chili every alternate Monday, commencing the 25th of June.

At pages 356–361, will be found a list, alphabetically arranged, of the Joint Stock Sugar Companies in Germany, with the quantity of beets which each Company has worked up, with the profits and losses made for the year 1886-87. The total number is 174—of these 111 show profits ranging from 24 marks to 242,071 marks, 38 show losses ranging from 14 marks to 161,913 marks, and there are 25 against which neither losses or profits are set—the balance has been either written off, or the returns are incomplete. There are 29 of these, each with a capital of 1,000,000 marks (£50,000) and upwards; 19 with a capital of 29,682,614 marks show profits of 2,029,531 marks, or an average of 7%, ranging from $\frac{1}{40}$ of 1% to 11%; 7 with a capital of 12,480,286 marks show losses amounting to 559,798 marks or an average $4\frac{1}{2}$%, and ranging from $1\frac{1}{3}$% to $8\frac{1}{4}$%; 1 company, capital 1,063,500 shows neither profit nor loss, and in 2 with a capital 7,500,000 the returns are defective.

Some of the smaller companies show remarkable results; 10 with a capital of 5,000,800 marks show profits amounting to 1,687,601 marks or an average of $33\frac{3}{4}$%, ranging from 15% up to 55%; on the other hand there are 10 companies with about the same capital, 5,343,701 marks, show losses of 976,413 or an average of 18⅛%, ranging from 10¼ up to 27%.

			Marks.
The total No. of companies....	174	Capital	..125,129,464
Companies, returns incomplete.	8	,,	.. 9,926,000
	166	,,	115,203,464
Declared profits amount to			5,308,182
,, losses ,, ...			2,132,050
		Leaves	3,176,132

Average 2¾% upon 115,203,464 marks, the amount of capital of the 166 companies, with complete returns.

The average capital of these 174 companies is 718,560 marks (not quite £36,000) per company.

The quantity of beets worked up by them is 80,270,934 cwts.; so that it would appear that these Joint Stock Companies furnish about one half of the sugar produced in Germany; the average price of 88% German beet sugar, during the period covered by these returns is 11s. 5½d. per cwt.

We are not quite clear whether the share capital, *in every case* represents the paid up capital, but it is quite the exception, not the rule, where it does not, and will not materially affect the percentage results.

On the 21st ult., a statutory meeting of the London Produce Clearing House, was held at Cannon Street Hotel, London, E.C. Mr. T. F. Johnson in the chair. The meeting was purely a formal one, held in accordance with the Companies Act; no report nor resolution being submitted.

The Chairman, after setting forth the advantages of the establishment of this Company, said:—

"It is too, the only system which will prevent overtrading, and it is the only one which will place traders on a perfectly fair footing towards each other, for the fulfilment of every contract will be secured, and each trader's deposit will be in exact proportion to his transactions—the millionaire and the man of moderate means being treated alike, and no credit given to either. In short, the operations of the clearing-house, as compared with the old system, will be like a currency based on gold, as against a paper currency without any metallic backing. The only persons, then, who have reason to fear the establishment of our company are speculators who exercise an influence on prices beyond their means. While, however, the clearing-house recognises the usefulness and necessity of legitimate speculation—that is, of speculation resting on a solid money basis—it is bound in its own interests, as well as in those of sound commerce, to check all attempts at cornering, and this it can do by the power it has reserved to refuse the registration of contracts, as also by the influence it will necessarily have over its authorised agents—the experts through whom alone contracts with the Company can be made. To initiate a new system of contracts and to settle the regulations necessary to each trade requires, of course, time. So far the only article in which we are actually dealing is Rio Coffee, to which the clearing-house has already given a recognised position in the London market. While, however, our company gives the security of sale enjoyed abroad, our merchants also naturally ask to be placed on an equal footing with continental ports as regards ocean freights, in which respect London has hitherto been at a disadvantage. I am glad to say that we have succeeded in removing this disadvantage, which will allow London to make use of its superior position, as compared with Antwerp and Havre, for dealing with the North of Europe. The depot business of this port is also likely to be assisted by concessions which are being offered to us in other directions.

Sugar—We are now completing regulations for the admission of sugar into the clearing-house, and other important articles will follow. So that when we have next the pleasure of meeting I hope it will be to report that we are doing such a business as will fully meet your expectations, and also prove of very material advantage to the trade of this port, and to all connected with it. It now only remains, gentlemen, for me to thank you for the patience with which you have listened to my remarks."

At page 350 we insert an article on this venture taken from "*The Financial News*."

At the General Meeting of Sugar Manufacturers of the German Empire, held at Cassel, on the 16th and 17th May, the question of how to determine the saccharine content of those sugars which polarize over 100° was determined. The existence of such sugars had already been mentioned by Scheibler in 1870, and it was clearly demonstrated in 1885 by Prof. Tollens that the substance which increased to a misleading extent, the property of turning the polarized ray to the light, was *Raffinose*, the power of which is, to that of true sugar, as 1·56 to 1. The fact of a sample of refined sugar having polarized 100·5, eventually induced the Excise Board to request a report on the systems in use, and this was handed in twelve months since, and condemned all the methods in use, but proposed nothing of any moment. A report of Dr. Scheibler, to whom the the sample in question had been sent, accompanied the other. He recommended a method, based upon certain assumptions, not fully verified, which gave the polarization as 98·3 in place of 100·5. The matter was debated at some length; Dr. von Lippmann contributing the remarkable statement that after testing sugars which contained raffinose, he had made of chemically pure sugar and chemically pure raffinose, a mixture exactly the same in composition, as the sugars previously tested, but the results were by no means always the same. It was ultimately decided to appoint a commission to investigate the question.

PROHIBITION OF SACCHARINE IN BREWING.—The following notice appears in the *London Gazette*: "Treasury Chambers, May 17th, 1888. Prohibition.—Under section 5 of the Customs and Inland Revenue Act, 1888, of the use in beer of a certain substance. Whereas it appears to the satisfaction of the Lords Commissioners of Her Majesty's Treasury that the chemical or artificial extract or product from coal tar, commonly called or known by the name of 'Saccharine,' is capable of being used in the manufacture and preparation for sale of beer, and that the use of the said extract of product is calculated to effect prejudicially the interests of the Revenue. Now the said Lords Commissioners, under the power conferred upon them by section 5 of the Customs and Inland Revenue Act, 1888, give notice that the use of the said extract or product, commonly called or known by the name of 'Saccharine,' in the manufacture and preparation for sale of beer, is hereby prohibited until further notice. Dated this 17th day of May, 1888.

"HERBERT EUSTACE MAXWELL, W. H. WALROND."

N.B.—A penalty of £50 is imposed by the said section for any breach of this prohibition.

The following, copied into the *Sugar Bowl Farm Journal* from the *Chicago Journal of Commerce*, would be alarming to our sugar colonies were it not the mere imagination of the brain. The same thing was said five years ago, and yet the production of sugar in the United States is to-day less in proportion to the consumption than it was then; and so it will be at the end of ten years from this time: "During the next ten years the Southern States will make their cotton into cloth for export instead of exporting the raw material; *will have a sugar product ten times the present;* will raise and make the jute bagging for their cotton; will produce ramie for a product rivalling silk; will produce raw silk for our silk mills, and five million tons of iron, and have a new process for providing their own structural and railway steel." It is surprising that any paper, having any reputation, risking it by publishing such absurdly extravagant statements.

On the 27th ult. Messrs. Biggs & Williams, Brewers, Cardiff, were fined £50 for having mixed saccharine with certain worts of beer, so as to increase the specific gravity, after the liquid had been charged with duty.

CANE SUGAR, GLUCOSE, AND SACCHARIN.

By Dr. T. L. Phipson, F.C.S., &c., London.

Formerly of the University of Brussels,
Member of the Society of Chemical Industry.

According to some recent experiments on the comparative sweetness of cane sugar and glucose derived from starch, it appears that it required 1·53 parts of pure glucose to produce the same degree of sweetness as 1 part of cane sugar. Mr. Schmidt, who made this experiment, thus corroborates what other chemists have done in the same direction. But in relating this experiment in one of the German chemical journals this writer adds the words "beet sugar."

We therefore ask, Did the author operate really upon *cane sugar* or with beet-sugar, which he evidently considers identical with it? Such an opinion has, indeed, been held by a large majority of chemists to within very recent years. But at present there exists considerable doubt in the minds of several careful observers as to whether cane sugar and beet sugar—even after a thorough refining—are really identical, though they yield the same centesimal composition—that is, the same percentage of carbon, hydrogen, and oxygen. But a very large number of *isomeric* substances, which are quite distinct as regards their nature and chemical properties, present the same case.

If they are the same substance how comes it that housewives will not, if they know it, use beet sugar for making preserves? Is it not already proved that *betose*, or beet sugar, will not make *syrup of phosphate of iron*, and other similar pharmaceutical preparations, that will keep so well as these same products made with *saccharose*, or pure cane sugar? Is it not probable that betose forms a kind of link between saccharose and glucose?

The only way to solve this important question is to ascertain the comparative action of organic and mineral acids upon samples of pure refined cane and beet sugar. The greatest care would be required in being absolutely certain of the source of the samples examined in this way. From some facts observed in the making of preserves (strawberry, gooseberry, raspberry, &c.), it would seem clear that vegetable acids reduce beet sugar to glucose much quicker than they do the same to cane sugar. That being the case, they are evidently not identical. I have alluded before to this subject in the pages of the *Sugar Cane*, and in the *Monthly Magazine of Pharmacy*, &c.; and I hoped, ere this, to have been able to bring forward more experimental evidence in support of these views, but hitherto I have not had sufficient leisure at my disposal.

A foreign periodical tells us that two parts of saccharin added to 2,000 parts of glucose will give the latter a taste similar to that of cane sugar. Whether this be true or not, it cannot alter the properties of glucose, and a simple chemical test will detect the latter, however much saccharin may be mixed up with it. The adulteration of pastry and wines, &c., with saccharin is beginning to attract serious attention. C. Schmidt detects saccharin in the residue left in evaporating wine, or other liquids to which it may have been added, by converting it into *salicylic acid* by careful fusion of the residue with caustic soda. As regards wine, after it has been rendered distinctly acid by addition of a little hydrochloric acid, the saccharin can be dissolved out by shaking with ether, or petroleum ether, two or three times. A little caustic soda is added to the altered liquid, which is then evaporated, and the residue heated to 250° centigrade, for about half-an-hour. The salicylate of soda thus produced is dissolved in water. Its solution gives a magnificent purple colour with a few drops of perchloride of iron.

THE LONDON PRODUCE CLEARING HOUSE.

(From *The Financial News.*)

Up to a comparatively recent period speculation in produce was confined within very narrow limits. Merchants bought abroad and sold on this market, basing their operations upon the presumed demand, and leaving as little as possible to chance. In the good old days merchandise seldom arrived to a loss, except in time of severe panic; dealers, when they speculated at all, had visible evidence of the existence of the goods in warehouses and docks, and prudence, foresight and intelligence reaped their reward. The introduction of steamships changed all this, and the telegraph completed the revolution. The exclusive and hardly acquired information, which formerly might bring a golden return to the clear-headed operator, now becomes public property as soon as it is acted upon, and, as a rule, the boldest speculator can have but a few hours' start of his competitors.

With the increased facilities for speculation, the wonder is that there has been so little disposition on the part of the public at large to enter the produce markets. One difficulty has been the absence of any recognised official quotations for any of the leading articles, except cotton; another, the absence of a central controlling authority for the regulation of, and prompt disposal of questions affecting contracts. With the enormously developed system of dealing in futures, now universally recognised as a necessity of business, however much it may be deprecated, these drawbacks have become more and more felt by the mercantile community, and the result has been that a vast amount of business has been diverted from our market to Hamburg and Havre, where the necessary machinery exists, and which have become the centres of speculation in produce, as far as Europe is concerned.

To meet the want in this market, the London Produce Clearing House, Limited, has been established, and the names connected with it are a sufficient guarantee of the importance of the enterprise.* Nearly every house of leading position in the mercantile world of London figures in the list of founders or supporters, and the board of directors is a highly influential body. The company has at present been at work a little over a month, and if, so far, it has not made itself much felt in Mincing-lane, the reason is to be found in the fact that at present its operations are confined to the single article of coffee, and in the general quietude of the markets. The *rationale* of the Clearing House is the security it offers to speculators, by guaranteeing both buyer and seller on contracts passed through the office, under very stringent regulations, of which the following are the most important. Business can only be transacted by affiliated brokers, and firms carrying on business within a radius of one mile from the Clearing House, who thus hold a position analogous to that of members of the Stock Exchange, and can be suspended or expelled for any irregularity. No contracts can be made for less than 500 bags of coffee—580 cwts.—or for quantities not divisible by 500 bags. The type adopted as a standard is No. 2 good Channel Rio. Upon every contract registered, a deposit of £100 for each 500 bags must be lodged in cash, or in approved securities, as cover, which must be increased in the event of a fall in prices at the discretion of the managers, who have the right to close the account in the face of a drop of 3s. per cwt., *i.e.*, about the amount of the original deposit.

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* In the *Sugar Cane* for March, page 127, we gave a list of the founders and directors, with an article from *The Standard* on this undertaking.

It will thus be seen that the risk of the speculator is reduced to a minimum, since there is no fear of his losing his difference by the breakdown of any intermediate operators, as is often the case where produce passes through many hands before delivery. At the same time the company takes good care of itself. With margin in hand from buyers and sellers, a loss should be very exceptional, while it takes commission from both and a share of their brokerage from the brokers, besides deriving profits from the deposits. Whether the success of the company will justify the rather sanguine anticipations which have been indulged in, remains to be seen; a very great success must be achieved to warrant the extravagant value said to be attached to the few founders' shares, though they are to enjoy 25 per cent. of the profits after payment of a moderate dividend. The extraordinary prosperity, however, of the cognate institutions at Havre and Hamburg would fully account for the ready response of the public to the invitation to subscribe for shares. Few people not immediately interested have any idea of the magnitude of transactions in such an article as coffee, and will be surprised to learn that contracts for something like 15,000,000 bags represent the transactions of the Hamburg or Havre Clearing Houses during one year. This is in coffee alone, and does not include cotton or sugar. The commission on figures like these soon mounts up to a handsome profit. London is a far larger market than either of the above, and doubtless will attract much of the speculative business. Later on, the operations of the company will, we understand, be extended to sugar and the metal trades.

Naturally, the establishment of the Clearing House has caused some flutter in Mincing Lane, where opinion is much divided. The older steady-going folk shake their heads, and call it a gambling shop, destined to be the ruin of all legitimate trade; by those more abreast of the times it is recognised as a necessity. Men will deal in futures, and for a gambler it matters little what may be his counters—coffee or cotton or stocks and shares. While, therefore, it must be admitted that the Clearing House with its daily quotations and prompt settlements will offer every inducement to speculators, it at the same time supplies safeguards which did not exist before. We do not see why it should interfere with the legitimate business of the Lane, and if it imports an additional element of gambling into our midst, the deposits will keep weak men out, and the sportive youth, accustomed to small dabbles on the Stock Exchange, will find the £100 a disagreeable preliminary to a flutter in coffee. The progress of the new company, *the management of which appears to be chiefly in German hands* (the italics are our own), will be watched with interest.

NOTES ON THE ESTIMATION OF MILK-SUGAR IN MILK BY MEANS OF THE POLARISCOPE.

BY DR. P. VIETH, F.C.S., F.I.C.

Paper read at the Meeting of the Society of Analysts, February, 1888.

Twelve months ago I brought before you the results of a number of complete milk analyses, and made some observations with regard to the analytical methods employed. I then stated that the milk-sugar was determined by means of the polariscope, and that I followed the directions laid down by Schmoeger for preparing a clear whey. In the discussion it was remarked that the results might perhaps come out different and more correct if mercuric nitrate were employed for removing albuminoids and fat, instead of acetic acid and basic acetate of lead. The method of precipitating by means of mercuric nitrate has been described in THE ANALYST, XII., p. 196.* I made some comparative experiments and found that the results were not materially influenced, but came out practically the same, whether the precipitation was effected by acetic acid and sub-acetate of lead, or by mercuric nitrate. However, I adopted the latter mode of procedure as the more simple and expeditious. According to Schmoeger, one has to precipitate with acetic acid, filter, add sub-acetate of lead, boil, cool down, replenish evaporated water, and filter again; while, when precipitating with mercuric nitrate, the latter is mixed with the milk and the mixture brought on a filter, when clear whey runs off ready for polarisation.

The whey thus obtained is always perfectly bright, not only when poor or normal milks are under examination, but also when rich milks and even cream of the greatest possible richness are operated upon. I have experimented with cream containing upwards of 50 per cent. of fat, and still got quite clear whey. This is rather surprising, considering that such a cream contains about 2·25 per cent. of proteids only, an amount which would appear altogether inadequate to encase on precipitation 50 per cent. of fat, that is more than twenty times its own weight and about thirty times its own volume. I thought it not improbable that the mercuric nitrate might perhaps have a direct action on the fat globules, such as rendering the liquid fat, of which they are composed, solid, and that in consequence of an alteration of this kind they might adhere to the coagulum and not run through the pores of the filter. But microscopic examination did not reveal any change in the shape and appearance of the fat globules.

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* See also "Foods and Food Adulterants, U.S. Department of Agriculture, Washington, p. 113."

There is one difficulty when operating on cream rich in fat, viz.; to get a sufficient amount of liquid for polarisation. The mixture of cream and mercuric nitrate solution does not retain the character of a liquid, but attains that of a pulpy mass, its consistency increasing with the increasing percentage of fat. I am in the habit of taking 50 c.c. for the milk-sugar determination. Experimenting with a thin cream containing about 25 per cent. of fat, not sufficient whey drained through the filter to fill a 200 millimeter tube, and I had to use slight pressure to get the required quantity. With richer creams the difficulty is getting greater, and cream containing upwards of 50 per cent. of fat gave a few drops of whey only when the filter in the funnel was subjected to a pressure of two pounds. In such cases then it is necessary to dilute the cream with, say, an equal volume of water before precipitation.

Schmoeger has found that the volume of the precipitate caused by the addition of acetic acid to 100 c.c. of milk is between 5 and 6 c.c., and in the article on the employment of mercuric nitrate for preparing the whey for polarisation, it is stated that the precipitate from 60 c.c. of milk occupies the space of 2·4 c.c., equal to 4 c.c. from 100 c.c. of milk. Such statements and directions for working the process in question based upon them are rather misleading. Schmoeger worked upon milk containing something like 3 per cent. of fat, while in the other case the amount of fat varied from 3 to 5 per cent. Supposing a milk contains 4 per cent. of fat, this alone would occupy the space of 4·3 c.c., and to it would have to be added the volume of the precipitated proteids. It needs not many words to demonstrate the absurdity of once for all fixing a definite correction for the volume of the precipitate, as if this were a constant factor. The volume of the precipitate must of necessity vary with the varying quality, and more especially richness of milk.

It is a too well-known fact, to be dwelt upon in this place, that of all the milk constituents the fat is the one which varies between the widest limits. The percentage amount of the non-fatty solids is not subjected to such wide variations; and as the non-fatty solids consist of three compounds or groups of compounds, as, moreover, it has been proved, that these three constituents are in normal milks always present in very near the same relative proportion, we may expect the proteids to vary very little indeed in their percentage amount. According to my experience the limits for proteids are about 3·5 and 4·0 per cent. I believe I cannot be very wrong in assuming that this amount of proteids, if precipitated in 100 c.c. of milk, will occupy the space of about 3 c.c. If then 3 c.c. of mercuric nitrate solution were added to 100 c.c. of milk, free of fat, or 1·5 c.c. to 50 c.c., the filtrate would for polarisation be equal to the milk employed. The reading of the polariscope would represent percentage of sugar by volume, which can easily be transformed into percentage by weight, by referring to the specific gravity. If, however, as always will be the case, fat is present, another calculation becomes necessary. The percentage amount of fat is to be enlarged in the proportion of 93 to 100, the product being percentage of fat by volume, and the amount of sugar read off to be reduced in the proportion of hundred times specific gravity of milk (specific gravity of water=1) to 100 minus volume of fat. The figure thus obtained represents the amount of crystallised milk-sugar, and is to be reduced by one-twentieth of its value for water of crystallisation.

An example will perhaps show more clearly the mode of proceeding. Supposing we have to deal with a milk of specific gravity 1·0325, and containing 3·72 per cent. of fat. To 50 c.c. of this milk is added 1·5 c.c. of mercuric nitrate solution; the whey on polarisation indicates 5·1 per cent. milk-sugar. The necessary calculations are then as follows:—

$$93 : 100 = 3{\cdot}72 : x. \qquad x = 4{\cdot}0.$$
$$103{\cdot}25 : 96 = 5{\cdot}1 : x. \qquad x = 4{\cdot}74.$$
$$4{\cdot}74 - {\cdot}24 = 4{\cdot}50.$$

In case an excessive amount of fat should be present, the percentage quantity of proteids will naturally be depressed to some extent, and the quantity of mercuric nitrate solution may be reduced accordingly. But, even if this is not done, the error will be very slight indeed, as may be gathered from the fact that cream with 50 per cent. of fat still contains about 2·25 per cent. of proteids.—From the *Analyst*, April, 1888.

STATISTICS, SHOWING THE RESULTS OF THE SHARE-HOLDING SUGAR COMPANIES IN GERMANY FOR 1886-87.

For the following particulars we are indebted to the *Deutsche Zuckerindustrie.* The share capital and the amount of beets worked up being given, our readers will be able to better estimate the importance of the profits and losses, which are also stated.

Name of Manufactory.	Share Capital.	Quantity of Beets worked up.	Price of Beets per Cwt.	Written off.	Profit.	Loss.
	Mk.	Cwts.	Pfg.	Mk.	Mk.	Mk.
Aderstedt	955,500	634,580	72	60,320	54,821	....
Ahrensboek	550,500	256,000	62	29,414	....	69,427
Ahstedt-Schellerten	495,000	362,730	112	30,428	7,336	....
Algermissen	450,000	315,220	96	37,413	37,775	....
Altenau bei Schöppenstedt	450,000	385,640	....	32,621	52,146	....
Altfelde	600,000	487,110	80·9	40,270(1)	....	....
Alt-Jauer	1,500,000	1,130,630	100	86,400	....	85,959
Ameln	900,000	432,810	135	70,629	....	161,913
Anklam	500,000	413,094	72¾	91,530	53,478	....
Badersleben	660,000	480,000	90	29,317	129,529	....
Badische Gesellschaft für Zuckerfabrikation Waghäusel	4,714,286	952,858	116	147,010	....	103,262
Barum	381,750	514,300	102	21,982	163,553	....
Bauerwitz	655,200	486,310	110	64,866	40,687	....
Bedburg	666,000	714,040	89	89,410	....	82,693
Bennigsen	683,100	515,700	104	79,416	102,195(2)	....
Bernstadt	705,000	407,510	88·06	11,340	3,300	....
Böblingen	685,714	198,652	....	....	31,404	....
Bockenem	578,400	325,130	78·5	41,180	....	....
Brakel	1,242,000	694,330	86	46,671	1,439	....
Bredow	1,200,000	399,265	96	19,715	20,119	....
Brehna	412,000	432,888	80	15,000	147,754	....

Broistedt	412,500	374,090	96	32,789	71,260	....
Broitzem	230,250	189,900	80	13,624	34,663	....
Brühl	1,050,000	1,160,000	115	45,713	34,847	....
Burgdorf	416,250	370,000	76·5	39,193	29,600	....
Camburg	700,000	642,800	105·3	42,422	79,534	....
Clauen	450,000	304,720	102·2	31,000	....	....
Cönnern	180,000	255,595	225 (3)	18,629	29,986	....
Culmsee	1,300,000	1,934,235	79·4	230,323	387	....
Dahmen	1,500,000	497,910	82	83,119	....	20,515(4)
Demmin	750,000	873,500	79	39,046	23,386	....
Dettum	300,000	370,410	80	16,734	110.093	....
Dirschau	450,000	513,714	90	47,643	98,051	....
Dirschau Ceres	599,100	504,970	90	62,495	29,244	....
Döbeln	690,000	625,000	....	73,458	....	57,566
Dröbel	150,000	349,000	....	9,814	....	27,290
Duderstadt	354,750	157,570	42·6	27,538	855	....
Ebeleben	547,000	341,680	80 (5)	37,341	....	....
Eichthal	315,000	358,830	90	104,445	....	13,421
Eilenstedt	1,080,000	444,834	80	....	3,037	....
Eilsleben	802,500	682,480	90	85,523	20,024	....
Emmerthal	900,000	399,040	87·6	60,995	78	....
Equord	192,600	198,090	90	37,847	....	11,375
Etgersleben	219,600	218,850	75	20,799	3,036	....
Fallersleben	754,500	528,110	95	44,241(6)	179,980	....
Frankenstein	526,000	461,450	84·9	47,169	....	9,884
Fraustadt mit Raffinerie Glogau	1,100,000	1,017,960	97	98,652	....	36,282
Gandersheim	443,400	464,260	52	37,278	242,071	....
Garte	357,000	234,140	....	....	....	....
Glauzig	4,500,000	554,600	101	56,757	138,646	....
Görchen	500,000	305,520	93·3	24,515	....	21,674
Göttingen	259,000	312,510	91·5	42,998	11,107	....
Gronauer Rübenzuckerfabrik	360,000	389,270	100	68,000	19,127	....
Gross-Düngen	540,000	425,140	79·4	48,910	24,574	....
Gross-Gerau	530,000	568,000	97	35,000	27,708	....
Gross-Mahner	416,100	270,100	....	68,672	26,826	....

STATISTICS OF THE SHARE-HOLDING SUGAR COMPANIES IN GERMANY FOR 1886-87.—*Continued.*

Name of Manufactory.	Share Capital.	Quantity of Beets worked up.	Price of Beets per Cwt.	Written off.	Profit.	Loss.
	Mk.	Cwts.	Pfg.	Mk.	Mk.	Mk.
Gross-Peterwitz	699,900	401,000	....	....	....	....
Güstrow	836,500	820,654	74	47,584	16,128	....
Hadmersleben	780,000	965,290	....	53,070	43,747	....
Harsum	675,000	367,000	98·5	38,851	9,505	....
Hasede-Förste	272,055	180,830	59·5	27,203	....	3,259
Haynau	800,000	343,000	96·5	56,471	47,000	....
Hecklingen und Neundorf	214,000	377,000	110	39,709	....	....
Hedwigsburg	465,375	416,310	98	47,218	60,567	....
Heilbronn	1,660,714	304,730	110·5	21,675	68,151	....
Hessen	396,000	703,790	120	21,736	90,795	....
Hohenhameln	300,000	210,050	86	37,356	21,438	....
Hoiersdorf	297,000	417,000	....	22,821	....	....
Holzminden	1,141,400	225,000	68·3	....	44,198	...
Hornburg	300,000	414,750	90	11,781	10,500	....
Hünfeld	377,700	160,000	55	18,088	590	...
Immendorf	330,000	332,920	95	16,485	67,285	....
Klein-Wanzleben	2,700,000	413,100	96	64,014	135,956	....
Klützow	855,000	541,820	75·4	46,824	109,156	....
Königslutter, Aktien-Zuckerfabrik	240,000	429,830	90	33,960	....	....
Königslutter vorm. Rühland	615,000	535,350	92	19,691	270	....
Körbisdorf	2,700,000(7)	554,430	93·75	30,486	142,022	....
Kosten	917,500	612,000	98·4	45,705	95,590	....
Kruschwitz	1,500,000(8)	706,410	91·5	170,991	67,713	....
Kujavien	900,000	725,960	100·8	88,389	32,920	....
Lafferde	480,000	362,380	90 (9)	44,365	1,999	....
Langenweddinger Aktein-Zuckerfabrik	240,000	250,158	....	23,028	2,220	....
Lehrte	263,400	260,000	....	33,692	....	1,073
Liessau	480,000	463,120	90	9,021	4,507	....

Linden-Hannover	464,400	414,700	95	67,162	1,066	....
Lippesche Zuckerfabrik Lage	625,000	354,000	92	45,652	38,667	....
Löbau (Oberlausitz)	1,200,000	453,000	91	77,760	92,140	....
Maingau	702,000	437,000	110	....	21,280	....
Malchin	600,000	752,340	101	35,711	45,068	....
Bahnhof Marienburg	460,000	389,820	90	39,605	....	125,613
Marienstuhl bei Egeln	300,000	533,660	....	....	....	....
Marienwerder	600,000	324,510	77	11,926	....	31,429
Markranstädt	450,000	438,020	82·5	23,495	51,287	....
Mattierzoll	342,000	625,680	113	40,495	14,791	....
Melno	518,000	390,160	77	23,293	....	....
Mescheriner Zuckerfabrik	596,000	451,590	90	17,432	....	103,096
Mewe (10)	409,100	......	....	....	....	....
Mühlberg a. E.	582,000	427,550	105	69,174	67,496	....
Münsterberg	1,000,000	452,940	....	....	....	138,764
Munzel-Holtensen	300,000	168,000	90	24,388	....	45,560
Nakel	699,600	602,520	80	52,851	26,489	....
Neuhaldensleben	723,000	447,210	90	46,850	....	32,208
Neu Schönsee	600,000	272,000	75·7	....	615	....
Neustadt in Oberschlesien	750,000	287,360	100	59,108	4,179	....
Neuteich	600,000	511,750	90	17,569	24,569	....
Neuwerk (Sarstedt und Gehrden)	1,500,000	685,700	110	....	....	....
Niederndodeleben	350,000	300,000	....	....	....	14
Niederhone	461,000	507,760	84	25,000	....	37,490
Nordgermersleben	504,000	703,140	103·5	55,381	25,200	....
Nörten	1,012,500	1,082,390	84·1	70,520	5,564	....
Northeim	1,050,000	1,011,720	86·2	40,329	68,047	....
Obernjesa	750,000	454,140	90	48,207	33,222	....
Offstein	621,200	341,120	105	21,833	....	65,205
Oldendorf Bahnhof Osterwald	370,800	351,360	81	51,562	16,748	....
Oldesloe	581,500	209,450	65	36,039	704	....
Oelsburg	270,000	250,000	90	25,000	....	....
Opaleniza	1,100,000	913,560	95	119,256	134,260	....
Oschersleben	720,000	589,070	....	52,234	....	....
Osterwieck	412,200	373,260	....	37,326	....	....

STATISTICS OF THE SHARE-HOLDING SUGAR COMPANIES IN GERMANY FOR 1886-87.—*Continued.*

Name of Manufactory.	Share Capital.	Quantity of Beets worked up.	Price of Beets per Cwt.	Written off.	Profit.	Loss.
	Mk.	Cwts.	Pfg.	Mk.	Mk.	Mk.
Oestrum	363,500	216,190	73·8	30,545	2,379	....
Othfresen	343,200	257,340	91	34,788	5,053	....
Ottmachau	750,000	521,790	85	28,752	....	7,751
Papenteich zu Meine	410,000	191,800	....	37,412	15,337	....
Pakosch	700,000	462,520	92	149,972	....	136,263
Peine	379,800	370,510	196	25,570	148(11)	....
Pelplin	600,000	574,660	84·3	63,887	93,815	....
Praust	750,000	390,680	....	61,754	28,916	....
Zur Rast	379,800	282,700	76·7	22,866	....	12,470
Rastenburg	600,000	319,110	76	54,373	64,765	....
Rautheim	300,000	418,430	50	33,500	7,695	....
Rethen	729,300	472,000	....	53,951	2,295	....
Rhein. Aktien-Verein, Köln (incl. d. 2 Raffinerien Köln)	6,000,000	650,000	....	....	....	....
Riesenburg	560,000	355,660	76·2	51,617	....	134,118
Ringelheim	360,000	375,070	67·9	23,831	14,275	....
Rostocker Aktien-Zuckerfabrik	600,000	479,950	50	28,430	231,194	....
Schackensleben	559,500	417,020	....	49,683	2,353	....
Schaumburg in Oldendorf	427,200	218,285	65	25,546	....	....
Scheune	479,500	292,000	85	81,878	....	94,662
Schladen	800,000	718,740	105	39,401	39,285	....
Schöppenstedt	399,000	775,820	121	28,925	157,084	....
Schwetz	790,400	395,468	71	48,273	....	60,138
Seesen	371,250	383,780	85·5	23,239	24	....
Sehnde	520,200	340,000	....	45,832	26,389	....
Sobbowitz	591,000	345,800	80·49	33,772	....	....
Soest	1,200,000	562,510	111	43,610	28,989	....
Söllingen	240,000	442,120	70—115	19,868	....	....
Stavenhagen	745,500	405,960	90	46,008	....	....

Strassburg U.-M.	750,000	447,975	72	94,574	....	91,082
Stuttgart	1,320,000	346,920	....	60,165	103,028	....
Thiede	360,000	419,680	....	....	....	....
Tiegenhof	492,600	478,813	70	19,850	....	26,245
Trachenberger Zuckersiederei	600,000	371,290	....	6,149	....	25,772
Tuczno	583,500	529,710	90	59,266	....	69,636
Twülpstedt	400,000	212,670	56·3	30,119	....	3,543
Uelzen	300,000	435,000	....	....	....	....
Ummendorf	372,600	340,456	....	25,178	2,502	....
Unislaw	429,600	424,420	60	52,070	37,978	....
Uslar	360,000	208,760	60	34,321	27	....
Vechelde	300,000	202,000	83·5	21,151	72,683	....
Vienenburg	499,000	446,700	86	36,678	....	....
Wabern	600,000	716,000	86	31,443	5,579	....
Warburg	1,063,500	544,620	66	47,775	....	....
Watenstedt	471,000	463,740	80	9,140	87,818	....
Weetzen	690,000	430,480	126	62,281	3,446	....
Weferlingen	1,027,000	752,740	100	105,963	114,648	....
Wegeleben	1,664,000	873,080	....	62,592	....	103,105
Wendessen	367,500	298,635	80	24,571	124,148	....
Wetterau	835,200	546,790	104	36,390	35,577	....
Wevelinghoven (Gilbacher Zuckerfabrick)	600,000	596,510	103	20,777	....	10,382
Wierthe	270,000	228,000	100	15,560	29,931	....
Wierzchoslawice	1,002,000	663,800	100	111,447	....	71,911
Wreschen	675,000	421,260	84·39	55,411	72,333	....
Zduny	900,000	553,650	75·5	47,167	13,787	....
Zülz	817,000	253,000	....	57,518	57,396	....

(1) The entire profit (40,270 Mks.) was written off.

(2) 54,607 Mks. for the factory, and 47,588 Mks. for the farm.

(3) Price of beets includes cost of manufacture.

(4) Including a loss on farming of 29,895 Mks.

(5) 80 Pf. for beets bought without contract.

(6) Exclusive of further 12,000 Mks. written off.

(7) Share capital inclusive of value of farming plant.

(8) In addition to 1,200,000 Mks. debentures.

(9) Contract beets, 1·00 Mk.; bought beets, 80 Pf.

(10) Not now working.

(11) The profit on manufacture was 29,377 Mks., of which 29,229 Mks. were used to cover a loss.

BROWN COAL AND WOOD CHAR IN THE FILTRATION OF CANE JUICES AND SYRUPS.

By W. J. Thompson.

Continued from page 315.

A single industrial run of twenty-four hours was finally made January 16th and 17th with brown coal, with intent primarily to develop and locate any unforeseen mechanical difficulties incident to continuous work. Numerous such arose, of course, each happily, however, suggesting at once its own certain remedy. If technically, this large effort was not as satisfactory as might have been anticipated from the painstaking arrangements made for and well-organized and precise management accorded it, it was yet successful beyond all expectation in solving those problems which must ever attach in cane juice work to the application in filter-presses on a considerable manufacturing basis, of any matrix whatever. It removed at a stroke all necessity for the yet more extensive operations, which, as you know, had previously been proposed.

It is needless here to weary you with the details of this day's run, which, with its antecedents rather than with its consequents, demonstrated conclusively, as is believed, that while the filtration of the entire body of defecated juice thus, with brown coal, stands well among the mechanical possibilities, its application can by no means now conceived with us be rendered remunerative to the Louisiana industry. This your discernment will already have made quite as clear to you by what precedes, as it can by any present comparison between the weights and polarizations of its resulting products and those customary to the establishment in its treatment of like raw materials. Such data, indeed, await your command, but indicate to me no variation in *rendement* beyond that attributable to the accidents and incidents common with every-day factory experience. There occurred nothing of the oft and persistently predicted clogging, either of pumps, conduits, presses, or cloths. The cloths at the end of twenty-four hours showed no loss of transmitting power, and were washed with surprising ease.

In quality of products, no doubt, some advantage was recognized to accrue, bone-coal not being employed in the factory. Notwithstanding, in this particular also, disappointment was felt. In no other respect than this, surely, did the results of this experiment compare even favourably with those secured by Mr. G. L. Spencer, in 1886, with the Remmers and Williamson wood-char process, under the patronage of your Department at its Magnolia Station, as these stand officially reported in your Bulletin No. 15 (pp. 20-25, inclusive). So much more effective has vegetable char than brown coal been shown also in our own work, both as a filtering and as defecating agent, that, having abandoned the latter altogether, experimentation since several weeks with the former, in a laboratory way, with seed-cane, has now been in seemingly successful progress here. The following is not an unfair comparison, so far as experience yet teaches, between the two articles applied to juices somewhat deteriorated by long storage of canes:—

	Matrix required on weight of sucrose.	Improvement of purity coefficient.	Decolorization sulphured.
	Per cent.		Per cent.
Brown coal	30 to 45	0·30 to 1·90	60 to 80
Wood char	6 to 12	1·50 to 4·30	6 to 12

Lignite presents other disadvantages, as well, in comparison with wood charcoal. Upon concentration to syrup, juice filtered with whatever percentage of it, whether reduced with the low temperatures of vacuum evaporation or under atmospheric pressure, gives invariably an additional precipitate of matter probably rendered insoluble solely by the increase of density. No such precipitate has at any time, with any defecating agent, been observed after filtration with wood coal. How weak is its absorptive power, beyond that for colouring matters, is shown by the fact that, after filtration through paper alone, an improvement of but 0·03 in the exponent was secured to syrups from the ordinary lime defecation by subsequent treatment with 30 per cent. of the lignite. Below are the averages:—

[Concentrated in double effect.]

Syrup.	Solids.	Sucrose.	Glucose.	Exponent.	Glucose ratio.
After primary filtration through paper	57·60	47·2	4·55	81·94	9·64
After subsequent treatment with 30 per cent. lignite	62·70	51·4	4·76	81·97	9·58
Rise in purity coefficient with lignite	..	..	..	0·03	..

Although when freshly ground, and yet containing from 30 to 35 per cent. of hydroscopic moisture, it can be readily brought to mix intimately by mechanical means with the juices, this is scarcely to be accomplished in the large and regular quantities required if, having been long prepared, desiccation to 15 or 20 per cent. has not somehow been prevented; in which state, if sufficiently comminuted, it excels not only the kneading requirements of patent flour fourfold but becomes even dangerous from liability to spontaneous combustion. This infers the necessity for a grinder on the premises, with engine, foundations, sifters, elevators, mixers, shafting, belting, and their like *ad libitum*, in a structure apart from the factory building proper, which last would needs be protected from the attendant dust, as another serious sugar-making complication and care. Such a plant has been estimated, by a probably competent European engineer, to cost, for a 60,000-lb. diurnal output, erected upon this property, exclusive of the presses and their immediate appurtenances, but inclusive of building, not less than $10,000. Wood coal can, on the other hand, safely be prepared during the leisure of idle months, at home or elsewhere, and be mixed in the greatly reduced amounts called for, as wanted, with the most simple and inexpensive devices or be stored without injury or danger from season to season. Even wood char, however, for satisfactory filtration, should also contain a considerable percentage of moisture when ground. Otherwise the first run of liquor is likely to come charged with the char, requiring refiltration. It appears that this, unlike lignite, may be rendered in part too pulverulent, which last the enforced presence of sufficient moisture at the time of its reduction is believed to prevent.

Brown coal, again, is not known to exert even a favourable mechanical action on the soil's productiveness; that wood char exercises valuable functions in this regard is well understood among agronomists. If in the ordinary filter pressing of scums and sediments well-nigh the entire fertilizing content of the juice itself is already secured, leaving no credit for such properly to be conceded to either, for this mechanical advantage of charcoal something may well be deducted from its estimated first cost to manufacture. It presumably absorbs from the juice, also, fertilizing material in excess of the brown coal, equivalent to the additional rise it secures in the exponent of this. The aggregate bulk of brown coal required would be such as might well preclude economic distribution over the fields.

Considering the quality of the native brown coals as yet examined, the cost of transportation, and, if imported, the duty upon such enormous quantities of these as are demanded, the price of vegetable char, it appears, should compare most favourably with them throughout the Louisana sugar belt. Brown coal, in sugar work, demands also a royalty under letters patent; the patents upon wood char, in this application, have been permitted to lapse. Brown coal can not be revivified. Wood char, it is believed, can be reburned by superheated steam in any state of comminution, if found desirable. It remains to be known from the distillation of which variety of wood, however, the best quality of the last-named article for the purpose proposed is to be obtained. As saw-dust, oak is known to perform best, probably because of its excess in tannic acid.

As of application with whatever matrix employed it is pertinent only to add, as a further result of our experience in the matter, a few convictions touching the appliances best suited to the treatment of juice in considerable volumes.

The advantage of duplex, double-acting plunger pumps, extra large for their duty and operated at low-piston speeds, with exceedingly capacious air vessels and sensitive safety-valves placed close to the pumps, the last of equal conducting capacity with the feed-pipes, was fully indicated. To thus insure, by every means, against sudden variations of pressure, such, especially, as the vibratory pulsations inseparable from ordinary pumping plants, seemed essential to a cake of maximum uniformity and uniformly well adapted to lixiviation in all its parts, as before insisted. With the lixiviating apparatus itself this completeness in erection is even more prominently to be endorsed, except that, as no grit is here to be encountered, piston-pumps should suffice. A continuous stream of liquid running from the safety-valves, both juice and lixiviating, should be maintained during operation. In the most perfect practice no approach to theoretical displacement has been found to occur. This supplementary process is, unfortunately, at the most we have been able to make it, little more than has been expressed with the word lixiviation. Whiting and highly coloured liquids render its study facile.

The absolute necessity to the process of chamber presses, whether top, bottom, or central feed, and, conversely, the total unsuitability of frame-presses in general to it, was left in no doubt. Each operation consumes so short an interval that a large percentage of total time is spent in emptying. A chamber-press can be emptied readily in one-half the period consumed by one of the frame variety for the same number of cakes. As the cloths need be removed not oftener than twice a week the loss from this source, in employing such, is negligible. It is not true that cloths wear most rapidly from use in chamber presses, except these be ill constructed. The tendency during lixiviation which the water exhibits, however this be fed and no matter how superlatively perfect the cake is, to cut off itself a ready and continuous channel about the cake's peripheral joint with the iron frame, has been mentioned. This results in a sludge formed along the cake's feather edges which, upon opening the press, runs more or less, despite the best effort, down the frame's sides, especially along its bottom portions, compromising the joint which this afterwards makes with its adjoining cloth. Following three rounds with brown coal, such a press can not be made tight and after four or five may even refuse to close, except the surfaces be laboriously cleansed with iron scrapers. In chamber presses the peripheral joint is made between cake and cloth and not between cake and iron. From this fact alone it is far more perfect. Its form, however, if properly designed, is of yet greater importance and, presenting no longer necessarily a line of least resistance, reduces the chance of sludge, besides insuring, other things equal, a more uniform and complete displacement with reduced quantities of water by preventing the formation of such water channels as those before described. If, by any chance, a small amount of semi-liquid material here runs in like manner, notwithstanding, this interferes in but half degree with a press joint now made between two thicknesses of the fabric instead of between iron and one such. Although in top and bottom fed chamber presses the liquor inlet-ports of the individual chambers may be of greater diameter than those possible with frames, yet from liablility to obstruction the centre feed is to be preferred.

Any filter-press constructed for the use of brown coal or any of its congeners should be recessed for 1¼ instead of for 1 inch cakes. This statement will not remain true except that in all cases the wisdom of employing the matrix in excess is confirmed. A yet greater thickness in these might then perhaps prove still more advantageous were it not the limit at which, in such presses, the cloths have been made to stand. Without attempting an explanation of the fact, it remains that with chambers of increased thickness higher results per square foot of filtering area are attained, this dimension even doubled, curiously enough as it would seem, requiring but a very small fraction more of time for cake completion than before, so long as a slight excess only of matrix is in each instance employed. This is best illustrated in starch manufacture. Speed in filtration is, then, increased by this innovation, except for delicacy of matrix; a relative reduction in the amount of sweet-water to be dealt with is secured and proportionate time is saved in emptying.

Since it consumes no more time to empty thirty chambers presenting 400 square feet of filtering area than thirty aggregating but 220, presses of the former size should alone be used for the purpose under consideration. Such are decidedly cheaper in first cost per square foot of filtering surface; are as readily handled and kept tight, and require, proportionately to the work done, fewer labourers. They occupy scarcely more space.

The presses should be worked in batteries after the English plan, instead of by rotation, as practiced in Germany. This avoids a fall of pressure, with consequent loss of time and a cake ill suited to lixiviation in the other active presses, when one freshly prepared is set in operation. It also permits, which is of much consequence, low pressure at the start, which are gradually increased to high at the finish—a practice precluding all attempt at governing the pressure at the pump's throttle by an attached pressure regulator.

A precipitate invariably following evaporation, by whatever means accomplished, of juice filtered through brown coal, the filtration of syrup was accorded some study. For this purpose from 12 to 15 per cent. of lignite on the weight of sugar operated upon was found necessary to satisfactorily rapid work, previous treatment not withstanding. Again the improvement in purity was not marked, averaging 0·82; that in colour being the more conspicuous result, at about 40 per cent. of this removed.

For syrups from unfiltered juices the ratio of lignite had, of course, to be increased until percentages approaching those employed with juice had been attained. Equal amounts would probably have been necessary, in terms of sugar, except for scums removed and some 8 to 10 per cent. of the juice itself already filtered with these, decantation of clear liquor from skimmings not having been practiced. Mere bulk, thus, in the filtrate, was seen to exercise no perceptible influence in this work. The dilution of syrup by the addition of water in any amount can, of course, in no wise reduce the quantity of coal required, which is determined alone by the quantity and quality of non-sugar dealt with. Neither the net result in purity nor in colour was equivalent in filtered syrup from unfiltered juice to that secured in unfiltered syrups from filtered juice. The glucose ratios of syrups first filtered as such were always considerably higher than those of unfiltered syrups derived from filtered juices of like quality. It is supposed that by the filtration of juice—though this is left in all cases more acid by the process—certain active inverting agents are removed, thus reducing the losses otherwise sustained in concentration. The brown coal also removed an amount of reducing sugars relatively larger than that of sucrose lost in the operation, the glucose ratio being almost uniformly lower after than before filtration, whether of juice or syrup. The ash is also reduced.

Not above 550 gallons of syrup from unfiltered juice could be put through a 30 frame Kroog press with 25 per cent. of brown coal on the weight of its sucrose at one operation, this, complete, occupying about four hours. A $\frac{7}{8}$ inch frame or chamber was found ample in the treatment of syrups, but even for this work 400-foot presses, it is thought, would be preferred. Thinner frames would be necessary, with reduced percentages of lignite. Lower pressures than those mentioned for juice gave the more satisfactory results, which, also, should be extremely steady.

The cake from syrup filtrations following that of the juice, with or without lixiviation, when mixed with the amount of fresh coal necessary to bring the total of this to the usual standard, was found to perform about as well on a fresh supply of juice as an equal total of fresh coal, the amount of the latter being thus proportionately reduced. In practice this would obviate the difficulty of sweet water from the syrup filters. Wood char was given no trial in connection with concentrated liquors. The whole subject of syrup filtration, in filter presses, merits more thorough investigation than circumstances have yet permitted at this factory, although success with such can scarcely supplant the far greater necessity for previous treatment of the juices.

Experiments, by no means exhaustive, were also made with the Bauer process. This failed from the first. The mucilaginous impurities, passing through the interstices of the bone-char, reached and occluded at once the pores of the cloth, thus bringing operations to a speedy termination with every trial. The cloths were washed with great difficulty. To fully meet every prejudice, the entirely inutile use of various fabrics was resorted to. With bone-black, from coarse to finest, the result was always the same. Indeed, as is well-known, animal char in sugar work is an extremely poor filtering medium, no matter how skilfully revivified, and except for the preliminary Taylor or bag filtration could scarcely be used after the manner or in the per cents. at present common, except upon the highest centrifugal goods, even in the refining of sugars from which the major portion of non-sugar has already been removed, upon the plantation, in scums, sediments, and molasses—substances which are yet left remaining with us in our treatment of juices. It is imperative with this article, in our work at least, that it be used in quantities quite beyond the utmost ability of filter-presses to accommodate.

Notwithstanding the meagre results as yet secured, eventual success in the economic mechanical filtration of the entire body of defecated juice is not altogether despaired of. Its difficulties have been greatly underrated. All the juices thus far dealt with have been the product of milling under pressures attaining from 65 to 78 per cent. of these upon the weight of canes crushed. So successful throughout has been the routine work in this establishment with skimmings and settlings from all manner of canes and with many modes of defecation, and so small has been at any time the immediate improvement in the purity co-efficient attributable to it, and yet, by comparison, so easy and rapid a second filtration, as to have forced a conviction that in but an exceedingly small part of the total non-sugar resides well nigh the whole difficulty. This probably minute portion of especially refractory material has been traced, as an insoluble, suspended impurity, to raw juice direct from the rolls, which presents in the filter practically all the perplexities encountered after defecation, and may be followed thence quite to the molasses. The microscope has not identified it at 100 diameters. Fermentation fails to remove it. Although itself probably inert and harmless, it suffices to render most difficult or altogether impossible a process which, in effecting an immediate improvement, if only of several points in the exponent, would yet suffice before the by product was reached to add directly or indirectly a decided increment to the otherwise impossible *rendement*. Your success in filter-pressing carbonatated diffusion juices this season of 1887-1888, at the Magnolia Station, leads to the hope that this small part, whatever it may be, is either in great measure eliminated from the artificial juice by diffusion, or else is amenable to chemical treatment (other than carbonatation), such as it is reasonable to suppose will not escape adequate research. In either case the benefit to accrue would become important to the local industry, the substitution of osmosis for pressure in juice extraction by large central factories now seeming as if eventually inevitable.

It is proposed by the proprietor that the investigation of this subject shall continue at this place uninterruptedly throughout another season. At his desire I express the hope that it may not be impossible with you to detail a chemist from your department to aid in this search for an improved defecation. It is not to be overlooked how, to the present, your department, in pursuing its inquiries with respect of sugar manufacture, has neglected altogether the sulphur regimen universally found in Louisiana's practice, excepting only at its previously chosen station.

With much respect, Sir, I am yours, very truly,

W. J. THOMPSON.

DR. H. W. WILEY,
Chemist, U. S. Department of Agriculture,
Washington, D. C.

GLASGOW ROYAL EXHIBITION, 1888.

EXHIBIT OF MESSRS. JOHN WALKER & CO., Sugar Refiners, Greenock. Court 21. Class XIII.

This exhibit comprises samples of raw and efined sugars and syrup,—illustrating the process of sugar refining. On the upper annular shelf are typical examples of raw sugars from the principal sugar producing centres of the world. Amongst these will be found the finest cane varieties imported from Java, Peru, and Demerara; medium qualities brought from Porto Rico, Jamaica, and Mauritius; and the low products of India, China, and Manila. There are also samples of European beetroot sugar, which is imported in enormous quantities for refiners' use. On the same shelf may be seen dried specimens of the insoluble impurities removed from raw cane and beetroot sugars in the process of refining, which ought to convey to the mind of the uninitiated—more forcibly perhaps than can even the beautiful refined products in this case, the inexpediency, the imprudence of consuming sugar in its raw or dirty state. If further evidence of the sense of ocular demonstration were required to remove a lingering doubt, a peep through the microscope, which is placed in a convenient position, will be sufficient. There they show the sugar mite *Acarus sacchari*, which particular specimen (magnified 260 diameters) we may mention was obtained from a sample of crystallized Demerara sugar, which is a happy hunting ground for this insect. *Acari* exist in most of the dry varieties of *raw cane* sugar; one pound of which has been estimated to contain as many as 100,000 of these creatures. On the lower shelf, supported on tins of golden syrup, are exhibited specimens of the various fine, medium, and yellow qualities of refined "crushed" sugars, daily turned out by this firm, and which are characteristic of the Greenock industry; samples are also shown of "Scotch" granulated sugars in the most suitable grades for miscellaneous table use, and a sample of "Scotch" yellow crystallized sugar. The finer qualities of sugar in this exhibit, are well adapted for the manufacture of aerated waters and preserves. Beautiful samples of jellies made with these sugars are shown, and they are in as good condition as when originally made.

Many years ago "loaf" sugar was one of the regular products of Greenock refineries; but foreign competition, aided by State bounties, and the popular taste in favour of soft sugars, completely transformed the refining industry, and caused this class of sugar to drop out of production, so much so, that until recently no Scotch refiner turned out "stoved" sugar. From time to time attempts have been made, with more or less success, to revive this branch of refining, and recover from our continental competitors that advantage which, in fairness, they should never have been enabled to possess. That portion of this exhibit remaining undescribed is the outcome of an effort in this direction. There is shown fine "loaf" and "cube" sugar produced by means of apparatus recently patented by Messrs. J. Walker & Co. The novelty consists in enabling the operator to complete the several processes of moulding, draining, and liquoring blocks or plates of sugar in one apparatus. The large hollow conical blocks of pure sugar, which form conspicuous objects in the centre of the case, weigh nearly 2 cwt. each, and are (it is believed,) the largest "loaves" hitherto produced. In order to expose the core to view, and show the solidity, quality, and purity of the sugar, portions of the blocks have been broken off, and are lying in the case. These together with the samples of "cubes" distributed in the case, are the products of this patent, and are now exhibited for the first time. The process is past the experimental stage, and by it Messrs. J. Walker & Co. hope soon to be enabled to supply "stoved" goods in quantity, but it yet remains to be seen whether this new process will recover for Greenock somewhat of its former prestige.

THE CASAMAJOR PROCESS.

An Improved Method for the Filtration of Sugar and other Solutions.

The data and details here given are based on exhaustive experiments and practical working, made during the past two years, in the sugar refinery of Messrs. Havemeyers and Elder, Brooklyn, N.Y., who have adopted the process, and are now working it on a large scale.

This process was devised by the late Paul Casamajor, well known in sugar refining circles throughout the world, who at the time of his death had been chemist for Messrs. Havemeyers and Elder, in Brooklyn, N.Y., for more than twenty years.

It has long been the aim of scientific men and inventors to find a practical method for filtering exceedingly slimy liquids, by which the filtering surface of the apparatus employed would be kept from clogging: in other words, to make the deposit as porous as possible, so that filtration might proceed for a reasonable length of time, and thus obviating, to a great extent, the labour of removing and washing the cloths of the apparatus.

For this purpose various methods have been devised and a large amount of money spent, among which we would mention the "Brown Coal Process," the "Wood Charcoal Process," the "Diatomaceous Earth Process," and many others, all of which have been rejected by manufacturers after thorough trial, as the expense in each case was too great; the brown coal and charcoal could not be recovered after the first operation, and the diatomaceous earth was recovered only at great expense by calcining.

After many years of trial and disappointments, during which time many difficulties were met with and overcome, Mr. Casamajor brought to perfection the process in which he had never lost faith, living just long enough to see it adopted and running successfully on a large scale.

The following is a description of this process as applied to the filtration of sugar solutions, in which we will endeavour to set forth as clearly as possible the various advantages it has over the old method of bag filtration, though we desire it to be distinctly understood that it applies equally well to the filtration and purification of other solutions, chemical or otherwise. To the sugar solution to be filtered, after it has been brought to the desired density and temperature, we add a certain quantity of sawdust, according to the quality of the sugar, in quantities varying from 1½ to 3½ per cent.

This mixture is kept constantly agitated by means of a rotary mixer; as soon as the sawdust is well mixed with the liquor, the outlet valve is opened and the mixture pumped into the filter presses.

For this purpose it is highly important that the pump used should be so constructed as to maintain as regular and even a flow of liquor as possible, so as to insure a perfectly even deposit of sawdust, on which depends the success of the operation.

At starting, for a few minutes the liquor coming from the press will be quite cloudy, and must be run back to the tank from which it has been taken, but in a very short time a film of sawdust is formed on the cloths, which takes up and retains the finest particles of organic matter.

As fast as this sawdust begins to clog up fresh sawdust is deposited over it, so that a clean surface is constantly presented, which forms a perfect filtering medium, remaining porous to the end of the operation, the liquor running off clear and sparkling.

It is well known that by bag filtration the liquor is never absolutely clear until the meshes of the cloth are almost completely clogged, and the flow of liquor reduced to a nominal amount.

Filtration proceeds for from two to eight hours, according to the size of the press and the speed at which the liquor is forced through it, until finally the chambers are entirely filled; the pressure is now run up to 25 pounds to the square inch, in order to compress the cake into a firm mass, and the operation of filtering is finished.

Air or steam is then let into the press through channels so arranged that the cakes are blown first from one side and then the other; this lasts for about half-an-hour, in which time a large amount of liquor is removed in as clear a state as the filtrate and without reducing its density.

Water at 210° F. is now run in and the cakes washed for forty-five minutes, which removes nearly all the liquor, the last running off at about 10° B.

Air is again admitted to the chambers, blowing the cakes quite dry and freeing them from the cloths.

The press is now opened and the cakes fall out freely, leaving the cloths quite clean, so that several operations can be performed before it is necessary to wash the cloths.

Thus it will be seen that the cloths are used merely to retain the sawdust, which is the filtering medium; fine wire cloths have been found to work equally well, but common "burlaps" last a long while when properly handled, and cost very little.

From the press the sawdust falls into a tub on the floor below, arranged similar to a bone black filter, with a false bottom covered with a cloth.

Hot water is then run over the sawdust, which, after settling for fifteen minutes, is allowed to percolate through the sawdust and out at the bottom, running off as clear "sweet water;" in about three and one-half hours the sweetness is entirely removed and the sawdust is ready to be washed prior to being again used.

Here we would note a great advantage of this process over the bag filter method. It is well known that at least ten hours are required to "sweeten off" the contents of a bag; by actual experiment, where liquor has been run on testing 98 dry by the polariscope, the sweet water run off ten hours later tested only 75. This has been proven repeatedly.

Now, owing to the rapidity with which the cakes from the press can be sweetened off, on account of their porosity, the inversion is very slight. In no case have we found it to be more than three per cent., 98 testing liquor running off at 0° Baume at 95 test.

The saving here, in large sugar refineries, is enormous.

The sweet water thus obtained has been found to average about 8° Baume, and to be in pounds solid from 3¼ to 3½ per cent. of the sugar filtered. It is important that this should be immediately thickened up either by evaporation or by the addition of raw sugar, before inversion can set in.

Recovery of the Sawdust.

The next stage of the process is the cleansing of the sawdust, so that it may be used again.

For this purpose Mr. Casamajor invented an exceedingly ingenious machine, for which a patent has been applied for, by which large quantities of sawdust can be handled at a very slight expense.

After having been "sweetened off" the sawdust is placed in a tank, where it is mixed with about five times its volume of water; here it is agitated by a mechanical stirrer, or air blast, for half an hour, until the particles of dirt are somewhat loosened from the sawdust; it is then run into washing drums, which consist of a series of rotary wooden cylinders with one side open; the surface of these is covered with 50 mesh wire sieve, in order to retain the sawdust; inside and attached to the drums are buckets, which, as the drums revolve, raise the sawdust to the top of the drum, where a spray of water washes the dirt out through the sieve at the bottom, and the sawdust into a gutter which carries it to a second drum, thence to a third and a fourth, where the same operation is repeated; finally the water passing off is found to be perfectly clear, and the sawdust is allowed to pass into a tank with a false bottom, where the water is drained off and the sawdust is ready for use again.

PREPARATION AND COST OF SAWDUST.

To prepare "green" sawdust for use, it must first be ground sufficiently fine to allow it to pass through a No. 50 mesh sieve, that portion remaining on the sieve being again pressed through the mill until it is sufficiently fine.

The cost of a mill and bolter for sifting the sawdust, including elevator, &c., &c., is not more than $750, this, by the labour of one man, will grind 1,000 pounds per day.

The next step is to remove from the sawdust all gummy matters, &c., which tend to darken the colour of the liquor; for this purpose it should be allowed to soak for about two hours in a solution of carbonate soda, containing about 2 per cent. of this salt; after which it should be washed continuously with hot water for 24 hours, and it is then fit to use.

We have found white pine sawdust to be the best adapted to this process; this costs, delivered in New York City, less than a quarter of a cent a pound, and the expense of grinding it will certainly not be more than double this figure.

The stock of sawdust required for working say 100,000 pounds of sugar per day would be 5,000 pounds, costing, let us say, $50; now, assuming the waste to be as high as 200 per cent. a year, it will be seen that this expense is hardly worth considering.

ECONOMY OF CASAMAJOR PROCESS AS COMPARED WITH BAG FILTERS.

In order to illustrate, as plainly as possible, the economy of the Casamajor Process, let us suppose we have 100,000 pounds of raw sugar to refine daily, consisting of say 50 per cent. 96 testing centrifugals, and 50 per cent. poorest quality Cuba molasses sugar, or Ilo Ilo; now let us assume that, by the bag filter method, 500 bags are required each day to filter this amount, and owing to the length of time required to wash off and prepare the bags for use again, a capacity of at least twice this number is required to allow sufficient margin for continuous working. It has been found, by a long series of trials, that one cloth, measuring 36 inches by 36 inches, will filter as much liquor as 1 3-5 bags, so that a capacity of 313 cloths would be required to do the same work as done by the 5000 bags, and owing to the rapidity with which the cloths can be handled and prepared for use again, 50 per cent. additional would be a liberal margin for continuous working, thus 1,000 bags would be required as against 470 cloths.

The average "life" of a bag or a cloth is four months, which means a renewal of stock three times a year, from which we deduce the following estimate of comparative cost for one year:—

COST OF BAGS.

3,000 inside bags at 50c.	$1,500
3,000 outside bags at 25c.	750
Total	$2,250

COST OF CLOTHS.

470 "Burlap" cloths at 20c. - - -	94
Saving - - - - -	$2156

These figures are based on New York prices, with a liberal allowance in favour of the bags.

Furthermore, we would point out the saving in waste.

It is well known that the average loss per bag, of sugar that cannot be profitably washed out, is one pound, worth about three cents, which would amount to $15 per day on 500 bags, or assuming 300 working days to comprise a year, $4,500 total.

The labour required for working our process is slightly less than than that required for bag filters.

ADVANTAGES OF CASAMAJOR PROCESS.

1. Economy.
2. Clear and at all times uniform result.
3. Rapidity and ease of handling.
4. Saving in waste.
5. Saving in inversion.
6. Reduced amount of sweet water.

TO CHEMICAL MANUFACTURERS AND OIL REFINERS.

Although the foregoing applies to the process more particularly as adapted to sugar refining, we desire to call the attention of other manufacturers to it also.

Experiments are now being conducted in several large chemical works in this country, and very gratifying results are being obtained.

By using a filter press somewhat differently constructed a double filtering bed is obtained, by means of which the finest particles of foreign matter are removed.

THE VICTORIA INSTITUTE, JAMAICA.

A movement has been set on foot, as will be seen from the subjoined circular, with the view to the establishment at Savanna-la-Mar, the principal town in the parish of Westmoreland, Jamaica, of a library and lecture hall, which we have been requested to bring under the notice of our readers, and we have pleasure in doing so:—

Jamaica, W.I.,
Parish of Westmoreland,
March, 1888.

The inhabitants of the parish of Westmoreland, in public meeting assembled, having resolved that a fitting method of celebrating the Jubilee of Her Majesty's reign would be the erection of a suitable building to be called "The Victoria Institute," negotiations were opened—

1. With the Government for their sanction to the appropriation of some portion (£500) of a Parochial Surplus Fund to this purpose, which has been assented to under due regulations for the future management of the Institution.

2. For the purchase of a suitable piece of land in the chief town, Savanna-la-Mar, which we are glad to say has been secured.

There is in the town no suitable public building for a library, lecture, or assembly room, or for the holding of a public meeting, except an ill-adapted Court House of the parish, which building contains also the Public Revenue and Law Offices. Frequent sittings of the courts of justice and of the parochial boards necessitate visits to the town of respectable persons resident at a distance, who experience inconvenience from the absence of any other place of resort.

The cost of land, a permanent building and enclosure, for the above-named purposes, cannot be estimated below £1,200 and £1,400. The chief industry of the parish is sugar, the cultivation of which has been carried on for years under difficulty; and apart from those engaged in its production and in commerce, who may be supposed to be in better circumstances, the great bulk of our people are only maintained by their daily labour, and, unaided, could not accomplish the object we have in view.

We therefore appeal to those friends abroad who are interested in our people, or are engaged in the agricultural, commercial, and shipping concerns of Jamaica—perhaps of this locality—and ask them to come to the generous aid of a local subscription, so as to complete a work deemed so necessary to the progress of our people.

Reference is kindly permitted to Messrs. Thompson, Hankey & Co., 7, Mincing Lane, London; and Messrs. Perkins & Welsh, New York; who will receive and remit donations, which will also be thankfully acknowledged if sent to any of the undersigned in Jamaica:—

Savanna-la-Mar
P.O.,
Jamaica.

Will. Ewen, Custos of Westmoreland.
C. S. Farquharson, Member Legislative Council.
Jos. S. Segre, Chairman of the Parochial Board.
Edwd. J. Sadler, Esq.
Hugh A. Vickers, Esq.
W. N. Farquharson, Esq.

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, June 14th, 1888.

Fair Refining.	96o/o Centfs.	Granulated.	Stand. A.	Stock in Four Ports.
June 14, 1888.—4¾c.	5½c.	6¾c.	6¼c.	Jan. 1, 1888— 47,798 tons.
June 16, 1887.—4 7-16c.	5⅛c.	5⅞c.	5⅜c.	Jan. 1, 1887—102,279 tons.
June 17, 1886.—4¾c.	5⅝c.	6 3-16.	5¾c.	Jan. 1, 1886— 57,328 tons.
June 18, 1885.—5⅜c.	6⅛c.	6⅞c.	6⅛-¼c.	Jan. 1, 1885— 89,186 tons.
June 12, 1884.—4⅞c.	5 11-16c.	6½-9-16c.	6⅛-¼c.	Jan. 1, 1884— 60,900 tons.
June 14, 1883.—6⅞c.	7 11-16c.	8 13-16c.	8 5-16c.	Jan. 1, 1883— 50,297 tons.
June 15, 1882.—7¼c.	8 1-16c.	9 7-16c.	8⅞c.	Jan. 1, 1882— 43,927 tons.
June 16, 1881.—7⅞c.	8⅝c.	10⅝c.	10c.	Jan. 1, 1881— 66,999 tons.
June 10, 1880.—7 9-16c.	8⅜c.	10c.	9⅝c.	Jan. 1, 1880— 63,558 tons.
June 12, 1879.—6 5-16c.	7 1-16.	8 3-16-¼c.	7⅞-8c.	Jan. 1, 1879— 50,773 tons.
June 13, 1878.—7¼c.	8 3-32.	9¼c.	8¾-9c.	Jan. 1, 1878— 48,230 tons.
June 14, 1877.—9¾c.	11c.	12-12⅛c.	11⅝-¾c.	Jan. 1, 1877— 25,885 tons.

THE MANILA RAILWAY COMPANY, LIMITED.

The first ordinary meeting of this Company was held on 15th May, at the Cannon Street Hotel, London, E.C., the chairman of the Company, Mr. G. Noble Taylor, presiding.

The Chairman, after a few introductory remarks expressive of his sanguine feelings as to the prospects of the Company, stated:—

Our chief engineer, Mr. Higgin, who, I daresay you know, stands high in the profession, corroborates from his own personal knowledge and inquiry some of the most important statistics we have given. Writing in February last, he told us that he had been in communication with the engineer of the Spanish Government who had surveyed the line and prepaired the project, and that he had obtained from him full information upon all points; that he had examined his plans, his reports and his estimates, and having sent to Manila in the middle of last year one of his own engineers, in whose ability and judgment he has complete reliance, he is fully acquainted with the requirements of the line in every detail. He goes on to say:—"I am of opinion that the line can be well and substantially built and equipped by them (the contractors) for the price fixed in their contract, and I see no engineering difficulties of sufficent importance to prevent them executing the work within the time fixed in the concession. As regards the probable revenue to be derived from the line when constructed, the information furnished me from Manila by my own engineer, and that which I have derived from other reliable sources, leads me to believe that the probable results of the working of the line as set forth in the prospectus are not over estimated. The line will be an easy one to work, the gradient and curves being of favourable character, and I consider that under good management the working expenses shall not exceed 50 per cent. of the gross returns."

But our resident engineer (Mr. Bertadano), who has now been nearly a year at Manila, writes full reports of his proceedings. The work of the contractors' engineers will progress under his supervision; no funds will be disbursed by the company except on his certificates, approved and confirmed by the chief engineer; and we are satisfied that both he and his assistants will carefully guard the interests of the company, and will never lose sight of what I may call the axiom that upon efficiency of construction depends economy of maintenance. It will interest you, I dare say, to hear the progress that has been made up to date. In a further letter from Mr. Higgin, dated May 9th, 1888, he says:—"At the date of my last advices, March 31st, from Manila, Mr. Bertadano (our resident engineer) had completed the survey of the first 20 kilometres from Manila, and had staked out 8 kilometres. Immediately on receiving orders to proceed the contractors authorised the purchase of the land, and on March 31st they had secured possession of the first 8 kilometres, and were securing the station ground." Then in regard to contractors' plant:—"The first shipment of plant was made by the contractors in the middle of April, and a second cargo leaves in the middle of this month." As to materials:—"The contractors have entered into an engagement with the North Eastern Steel Company for the supply of all the rails, and the first 1,600 tons will leave this country about the end of this month." Then he goes on to say that about one-fourth, or 400 tons, of these rails have been rolled successfully and have passed all the tests to which he submitted them. "The contractors are now proceeding to the construction of the iron bridgework. I have received, by cable, the approval of the Spanish Government to the plans I sent out for this purpose." Then in regard to the staff:—The contractors' principal agent arrived at Manila on April 22nd, together with one of the resident engineers on behalf of the company. The contractors have also sent out four assistant-engineers and a cashier, and have engaged some other engineers resident in the country." I think, therefore, you will agree that no time has been lost so far in pushing on the work.

Now, the harbour of Manila is described by all who have seen it as one of the finest in the world; it is certainly one of the most frequented in the Eastern seas. The Philippine Islands, being a central point between China and Japan and the principal ports of Europe, by Singapore and Australia to the South, the position of Manila is extremely favourable to the development of a world-wide-trade. The marvel is that this trade has not yet attained larger proportions. I have found it very difficult to get at reliable figures representing the growth of trade and the increase of wealth and commerce and the population of recent years; but there is little doubt that there is an improvement, which it will be our mission to foster and augment. The figures which are given in the prospectus from official sources shows the value of the exports and the imports, and the returns of shipment from Manila and the Philippines, of the chief articles of produce, which are sugar, hemp, and tobacco. These figures are supported by those which I find recorded in several other publications—the "Statesman's Year-book," for instance—from which I hold an extract here, and the consular reports forwarded to the Foreign Secretary of State on the trade of Manila and the Philippines. The commercial intercourse with Great Britain and her colonies has certainly been in a fluctuating condition, by all accounts, for the last few years; but the present average value of the exports and imports may, I think, fairly be taken at £5,000,000 sterling exports and £4,000,000 sterling imports; and I find by a statement that about two-fifths of these exports go to Great Britain and her colonies, and more than one-half of the imports are received from there. Well, in his report for 1887 and his report for 1888, after giving returns of exports and imports and shipping, and information usual in consular reports, Mr. Gollan, the Consul, takes occasion to allude to the concession by the Spanish Government at Madrid to an English firm, for the construction of a railway from the city of Manila to Dagupan. The line, he says, is to pass through an extensive sugar district, and will of course be of great benefit to the neighbourhood; but, instead of welcoming it as an undertaking likely to prove successful, as well as beneficial to the trade of the country in which he is the British representative, his remarks rather tend to depreciate the guarantee by the Spanish Government and to discourage both shareholders and investors. He writes with very imperfect information, no doubt, and his letters are dated January 1, 1887, and January 1, 1888, when of course proceedings were not so far advanced as they are now; but I have shown, I think, that there is no ground for the view which he entertains. Facility of communication, we known, creates traffic. This is the great want of the Philippines, a want which our railway will supply to some extent—to one of the islands, at all events, of the group. The Island of Luzon, which the line will traverse, teems with luxuriant products of all kinds; the natural riches of the country are said to be incalculable, and there are no means for the conveyance of merchandise of all kinds but the common bullock or buffalo cart of the country, and boats and rafts which ply on the numerous streams between the north of the island and the capital. The loss and delay are described as lamentable, and we must remember that for many months of the year, when the monsoon rages, those are the only means of transport.

The population, which is dense enough at short intervals along the route which our line will take, is for the most part scattered and dispersed; there is no means of bringing them together, no aggregation, so to speak, of communities for the interchange of ideas and experiences, so favourable to civilisation and to production of wealth. Then we read, too, of magnificent forests, of minerals, and precious stones of various kinds below the surface, and yet unworked. Our railway will assist in developing these natural treasures, in improving the social condition of the inhabitants, stimulating their natural indolence, and furnishing motives for greater activity, inquiry, and research. This, then, is the future before us, and we think the prospect sufficiently encouraging. Anticipations of a prodigious traffic may or may not be realised, but we believe that the returns will be amply remunerative, and we may, at all events, have the feeling of satisfaction that we are the pioneers of the civilizing influence of the locomotive in these distant islands. Gentlemen, I will now conclude by making what I hope is the welcome announcement that the dividend on the shares and the debentures will be paid to all proprietors on July 1. We shall be very happy to answer any questions which may be asked. As this is merely a formal meeting we have no resolution to submit; there is no report or anything to lay before the shareholders, and we merely make this statement by way of informing the shareholders what has taken place up to the present moment, and of encouraging them to look forward to the future. (Hear, hear.)

Mr. G. Buchanan, who had lived a good many years in the Philippines, gave it as his opinion that the line would pay a considerable dividend without any Government guarantee whatever. He asked for some information as to the sum of £64,000, reserved for administration, the security of interest on shares and debentures until the line was completed, and the price of ironwork scheduled to be contracted.

The Chairman, in reply, said:—With respect to prices of materials scheduled, of course you will understand that our contract is for a lump sum; we do not go into these special prices for individual materials. The gentleman asked what security there was for the payment of interest? We keep the money in our own hands, and we give to the contractors all that it is necessary to pay; we only pay the contractors on certificates of the chief engineer.

Mr. Buchanan: What security is there for the sum of £64,000?

The Chairman: The whole of that is in hand.

A Proprietor asked how the guaranteed interest was secured?

Mr. T. Bischoff said there was a distinction between the guaranteed interest and interest payable by the contractors. A gentleman had asked what security the Company had for the payment by the contractors of interest during construction. The answer was that the whole of the capital offered by the prospectus, namely, two-thirds of the combined share and preference capital, had been allotted, and the Company had power to retain the interest, and did retain it, out of the capital as they went along. There was power to set off not only that interest but also £64,000, the amount for administration. There was a lien or set-off in the construction contract, which enabled the board to deduct from any amount payable to the contractors any moneys they had to find for the benefit of the Company, and the money was in hand. With regard to the guarantee after the opening of the line—that guarantee was payable by the Spanish Government; and as security under the concession, it was made payable out of the Manila Treasury, and corresponded with a payment here by the Secretary of State for India out of the revenues for India. Manila stood in much the same position towards Spain as India does to ourselves.

Another Proprietor: Supposing the working expenses exceed 50 per cent., how much will the Government guarantee be reduced?

Mr. Bischoff: If you cannot work your road at 50 per cent. of the gross receipts, the deficiency will come out of the shareholders' dividends. The Spanish Government always pay their guarantees.

The meeting then closed.

RAMIE IN CUBA.

By Santiago Dod.

To the Editor of *The Times Democrat.*

At the time of remitting my report to Cuba upon the Kauffman Decorticator, I wrote to a friend in that island who has devoted years to the study of the cultivation and decortication of ramie, and is thoroughly conversant with these industries, requesting him to examine the samples of fibre I sent to Havana, and after reading the description of the new machine to write me his opinion, correcting any errors I may have committed. I am so thoroughly convinced of the competency and trustworthiness of the gentleman referred to, as well as of the vast importance of this new crop to the future welfare of Louisiana, that I believe I shall contribute, in a measure, to the development of this industry which seems to promise so much, by translating as literally as the language will permit the greater part of his reply, He says:—

"Upon the receipt of your letter I had not yet seen your report upon the Kauffman decorticator, and I immediately wrote to obtain a copy, but as it had not yet been issued, they sent me a 'proof' which I have reperused a number of times with the greatest interest. The information you so lucidly give in your article induces me to believe that we have at last a machine, and a real machine, which will permit us to cultivate ramie upon a large scale. From your description I deduce the fact that Mr. Kauffman has invented, with a full knowledge of the requirements of the work, just the reverse of what a multitude of others have done in giving us a series of toys, more or less ingenious, but, industrially speaking, utterly useless.

"From the slip I send you, cut from one of the Havana papers, you will see how deceptive a certain kind of information is, and how ruinous it would be for any agriculturist to launch out with no better guarantee in planting 'ramie upon a large scale.' The extract referred to cites a number of decorticators as useful machines, which have been tried and, unfortunately, found most wofully wanting.

"Returning now, after this long digression, to the Kauffman machine: Judging from its manner of working, its construction, and the speed at which it moves, I deduce by calculation that it will give a ton of bark, freed from its woody matter, in ten hours' work. This would be the desideratum of all cultivators of ramie, and above all, if it does this amount of work with stalks in a green state. From what I have been able to judge, this machine does more and better work upon the green stalks. I call your attention most particularly to this point, as it is absolutely indispensable that machines for this purpose should work upon the green material and not upon the dry; for even if decortication should be easier in this condition, there are several very important considerations which would preclude this work, excepting in the dry months of the year, a time in which our crop of ramie would be only middling and often null. In our rainy season, with an atmosphere impregnated with humidity, the drying of the ramie in the open fields, as some have advised, would be ruinous to the bark, as a few hours after cutting the shoots, instead of drying, they would only ferment, destroying the strength of the fibre. To subject to artificial desiccation the enormous quantity of stalks yielded by a single acre, would, with the requisite buildings and work of carriage back and forth, be so great, that it is needless to enter into any calculations with regard to an expense which would alone absorb all the profits of the crop.

"If this machine will deliver a ton of bark clear of wood in ten hours, it is not imperative that it should thoroughly clean the fibre, as the removal of the gummy matters is a problem which has been already solved by a chemical process which is sufficiently economical. If this decorticator will, in the space of a few days, clear the wood from the bark of the number of stalks a 'caballeria' of land (33⅓ acres), which at a minimum will be 8,000,000 shoots of from 70 to 80 inches in length, so that only three machines would be needed to the hundred acres, nothing better need be asked at present.

"You will have observed that I have insisted upon the necessity of working off the product of a 'caballeria' of land in a few days, and this is necessary for the following reasons: As soon as the ramie stalk begins to change to a dark colour at the base, it is in a proper state for reaping, and this should then be accomplished as soon as possible, as the shoots cannot be left long in the field without injury. Besides, as you will readily comprehend the sooner one is cut the sooner there will be another crop. The number of these obtained in this climate will undoubtedly be five, and when the winters are mild, even six crops may be cut during the year from the same roots.

"The cuttings will be from 70 to 83 inches in length, except those raised after the month of November, as the north winds seem to have an almost instantaneous effect upon the plant, checking its growth almost immediately and crimping up the leaves (above all in the Nivea variety), developing at once the seed.

"Up to the present time there is only one variety of ramie generally known here—the Nivea—which, although the plants thrive wonderfully, I imagine is not the best for this climate, as it originated in the temperate portions of China. I was the first to introduce the Ulitis variety, which came from Java. The rapidity of its growth is truly surprising, and the yield is consequently superior to that of the other. To give you an idea of it, I will state that on May 24, 1885, I planted out about 2000. Within four months, day by day, and after two or three prunings, I reaped it in the regular way, and got an average taken from 60 stalks of 2 metres in length, and some of 2·40 metres. *Twenty-three days after this* I had a new crop, with a *great* many stalks of 1½ metres in length; so that you may calculate an increased production over the Nivea of from 30 to 40 per cent. Unfortunately I do not feel assured as to its commercial value, as the appearance of the fibre under a microscope makes me fear its quality is inferior to that of the other, at least for the finest class of goods."

The rest of the letter refers to plantations commenced at St. Jago, Villa Clara, Güines, Marianao, and other matters of local interest.

It would appear from the foregoing that New Orleans has the honour of producing the only successful machine for an object which has been occupying the attention of the world for many years. Furthermore, that Louisiana has at her command a new and valuable crop to diversify her industry, and one which will draw capital from the North, as well as the very best class of immigrants to till her rich vacant soil. It would also appear that this climate is favourable to the production of the best variety.

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., F.C.S., M.I.M.E., Patent Agent, 6, Lord Street, Liverpool; 6, Bank Street, Manchester; and 323, High Holborn, London.

ENGLISH.

APPLICATIONS.

5621. P. FRANKE, London. *For machinery for cutting bars of sugar or similar material into discs or blocks.* 16th April, 1888.

6030. R. HARVEY, London. (Communicated by T. S. Cornish, Demerara.) *Improvements in, and connected with defecators or eliminators for saccharine and other liquids.* 23rd April, 1888.

6098. G. FLETCHER, London. *Improvements in sugar cane mills.* 24th April, 1888.

ABRIDGMENTS.

6261. J. BUCHANAN, of Liverpool. *Improvements in apparatus for drying and granulating sugar, salt, and like substances.* April 29th, 1887. Consists of internal and external cylinders or cones, either plain or corrugated, which are revolved together by gearing. Said cylinders are supported in bearings on hollow axes which admit of steam or hot air being passed through the inner cylinder. The damp sugar or other substance is fed through suitable hopper into the space between the cylinders (which are preferably inclined) and passing through from end is heated, and dried by the steam contained in the inner cylinder. An air current carries off the vapour. Discs or other suitable appliances may be used to prevent the substance passing too quickly through the apparatus.

6936. P. J. E. Heffter, of Altjaner, Germany. *Improvements in the method of clarifying and saturating sugar solutions, especially beetroot rob, by the means of tannic acid or tannin.* May 12th, 1887. This invention concentrates the sugar solution and adds lime till the alkalinity equals at least 0·05. He then adds tannin "or its equivalent." The juice is now cooled to about 25° to 45° centigrade. A coarse grey precipitate separates, consisting probably partly of tannate of lime and nitrogenous impurities. The solution and precipitate are together heated to 80° to 95° centigrade when the latter absorbs any colouring matter present. For the sake of economy almost any substance capable of precipitating the lime present may be substituted for a portion of a tannin: *e.g.*, carbonic, sulphuric, or phosphoric acids.

7228. W. M. Sandison, London. *Improvements in apparatus for concentrating cane juice syrup and the like in the manufacture of sugar.* 15th May, 1888.

7411. A. Horn, London. *An improvement in saccharometers.* 19th May, 1888.

7456. J. S. Rigby, Liverpool. *Improvements in or relating to the ultilization of the lime mud refuse of sugar and other industries for cement and other purposes.* 19th May, 1888.

7640. W. P. Thompson, Liverpool (communicated by the firm of Diebl and Mensik, Austria). *New or improved filtering substance for filtering or decolouring liquids, applicable for treating sugar juices, and method of preparing the same.* (Complete specification.) 24th May, 1888.

7813. F. Bosshardt, of Manchester. (Communicated by Gustave Bocquet, of France.) *Improvements in the method of filtering and refining sugar.* May 28th, 1887. This invention is designed to utilise the scum or "black molasses" produced in refining sugar solution by means of charcoal, reduced to an impalpable powder, ox blood, &c., and consists in calcining or roasting said scum in a closed oven or retort. The gaseous products may be collected to be utilised in making ammonia, &c., and the solid portions, consisting chiefly of charcoal, are treated first with very diluted hydrochloric, acid, afterwards washed with water, and finally finished in a filter press.

8052. G. F. Redfern, London (communicated by W. P. Abel, British Guiana). *Improvements in and relating to centrifugal machines for use in the manufacture of sugar.* 1st June, 1888.

8053. G. Fletcher, London (partly communicated by G. Brocklehurst, Barbadoes). *Improvements in evaporating pans.* 1st June, 1888.

8064. F. W. Scott, junr., London (communicated by A. Freitag, Holland). *Improvements in tubular vaccum pans.* 1st June, 1888.

8198. J. E. M. Vincent, London (communicated by W. K. Withy, Queensland.) *A saccharine food for cattle, poultry, bees, &c.* 5th June, 1888.

GERMAN.

ABRIDGMENTS.

40256. Gustav Baumgarth, Brunswick. *Filling and cutting apparatus for sugar filling masses and other substances.* 25th November, 1886. The apparatus consists of a vessel with double walls, in which is arranged a cutting cylinder divided in separate compartments; the diaphragms of separation are provided with circular slots.

40775. Francois Jean Joseph Delori, Snaeskerque, near Ostende, Belgium. *Controlling apparatus for the weighing out of sugar beetroots.* 8th March, 1887. In a tunnel forming the connection between the elevator and the work rooms, moves a waggon, the dimensions of which permit it to adapt itself exactly to the size of the tunnel. The waggon never goes completely out of the tunnel. At the side wall of the tunnel is a counting apparatus which is only accessible to the controlling clerk. This counting apparatus is set in action when the waggon passes before it. Moreover, there is also at the end of the tunnel a counting apparatus which is set in motion only by the opening of a discharge door situated outside the tunnel.

40869. Robert Pzillas, Brieg. *Contrivance for packing up cubic sugar.* 16th January, 1887. The forwarding case is placed in an auxiliary case which can turn on trunnions, so that it can assume any inclined position. The cubic sugar is enclosed between two plates and afterwards laid in the packing case by withdrawing one of the latter plates.

41735. R. Pzillas, Brieg, Reg-Bez., Breslau. *A cutting machine for the transforming of cubic or plate sugar into lump sugar.* 16th January, 1887. A pair of horizontal knives, which first cut long strips of sugar from the sugar plate, receives its motion from the to and fro motion of a spur wheel, actuated by a rack, to which an up and down motion is imparted by the driving shaft. The upper knife or shear is provided with a slot which is somewhat inclined on the horizontal, and through which passes a projection fixed on the frame of the machine, so that in its to and fro motion, the knife is somewhat shifted downwards. Thus a more uniform action of the knife is obtained, as it removes the uneven parts of the sugar plate before cutting. The lower knife blade is raised by means of a cam. The strips of sugar thus obtained are cut into small cubes by means of an arrangement of vertical knives.

41735. R. Pzillas, Brieg, District of Breslau. 22nd June, 1887. Patent of addition to Patent No. 41735, of January 16th, 1887. *Improvements in the machine described in the said principal patent for cutting cubes out of sugar plates.* The improvement consists in rendering the vertical knives capable of turning on the bolts fastening them to their frames, and the knives perpendicular to them are placed one behind the other, so that their edges form a succession of strips, the whole for the purpose of obtaining a more uniform cutting action on the surface of the sugar plate.

41944. J. Schwager, Berlin. 29th April, 1887. Patent of addition to Patent No. 40819, of January 11th, 1887. *Improvement in the apparatus patented under No. 40819, for the condensation of the vapours and simultaneous heating of the water.* For the purpose of obtaining a cooling surface as large as possible, a fine state of division of the cooling water and an intimate contact of the same with the vapours produced in the evaporation of the juice, double rows of trays placed one over the other, and a funnel shaped device below them, are employed. One tray is fixed to the sides of the apparatus, and is provided with a central hole, whilst the trays above and below it are circular ones of a diameter somewhat larger than that of the central opening, the latter trays are mounted in the axis of the apparatus.

In a modification of the apparatus the said trays are connected by means of pipes through which the entering water circulates. In the axis of the apparatus is a hollow and jointed body with openings for the entrance and exit of the water.

42001. F. Wellner, Pilsen, and H. Jelinek, Prague. Third Patent of addition to Patent vacuum apparatus, No. 6958, and to Patents of addition Nos. 23078 and 24001. 26th April, 1887. The archimedean screw mentioned in Patent of addition No. 23078, by means of which the emptying of the apparatus is accelerated, is replaced by emptying flap valves hinged on annular levers, one arm of which is applied to the said valves, whilst the other arm is connected to a screw, permitting thereby a pressure of the valve against openings in the bottom of the apparatus, or the removal of them therefrom.

42754. L. E. A. Prangey, St. Ouen, France. *A process of refining sugar, and apparatus therefor.* August 19th, 1887. The sugar filling mass is introduced in the shape of a wide thin band between two endless ribbons or straps running over rollers. These two straps lead the sugar mass slowly through the whole apparatus, so that it becomes completely transformed into pure white sugar ready for consumption. Above and below the aforesaid endless ribbons are placed reservoirs, the upper ones communicating with a forcing pump, the lower ones with an air pump, for the purpose of introducing or pumping out the cold or hot air, or the cleare. The filling mass before being introduced between the two straps is placed in a funnel-shaped receptacle, surrounded by cold water. It cools in this receptacle, partly sets, and is formed into the shape of a ribbon.

ABRIDGMENTS.

42297. H. Keferstein, Schöningen. *Drying machine for sliced beetroot.* 7th May, 1887. This apparatus consists of a rotating vertical hollow cylinder, provided externally with a helical surface, so as to form a screw conveyor. The inside of this conveyor is heated by a current of steam entering at one end, and issuing at the other. The vapours emitted by the drying beetroot slices pass into a surrounding room, whence they are exhausted, either by the condenser and air pump, or by compressed hot air entering and leaving the apparatus through suitable openings.

42353. Maschinenbau - Actiengesellschaft, late Breitfeld, Danek, & Co., Prague-Karolinenthal. *Bag filter with frames of corrugated metal sheet.* March 15th, 1887. The juice to be filtered enters the apparatus through suitable pipe connections, and passes into the filtering frames made of corrugated metal sheet, surrounded by filtering cloth. The top parts of the filtering frames are fitted into pipe in which the filtered liquid rises, and is led to an outside gutter.

BELGIAN.

ABRIDGMENTS.

69477. G. A. Hagemann, Brussels. *Improvements in deodorizing beetroot sugar and removing the bad taste thereof.* 3rd July, 1885. The inventor claims the removal of the bad taste and smell from beetroot sugar by saturating or decomposing (after saturation) the particles of lime, alkalies or salts, composed of these matters, by means of any acid forming combinations without smell or taste.

69483. L. Faucheux, Antwerp. *Improved method of extracting matters foreign to sugar, molasses, syrups, etc.* 3rd July, 1885. This invention has for its object the use of hydrocarbons of any sort, which have the property of dissolving the fats or resins, for the purifying of molasses syrups, sugar juices, of any origin, whatever mode of operating may be used and for the purpose of avoiding fermentations, the use of di-sulphide of carbon in the purifying of molasses and syrups and to avoid their fermentation, whatever mode of operating may be used, and the use in the purifying of sugar juice of di-sulphide of carbon with a preliminary addition of sulphuric acid.

69632. E. Van Haesendonek, Brussels. *Improved apparatus for the refining of raw sugar.* 18th July, 1885. (Principal Patent of May, 1883.) It is also possible to form by means of the square moulds mentioned in the principal patent bars of sugar of 6, 7, or 8 square centimetres, which are retailed after having been cut in small cubes, one centimetre thick. 1. For this purpose four small bevelled boards are placed inside the mould so that the same square is obtained at the bottom as at the top. 2. When the above form is obtained, small longitudinal partitions of galvanized sheet iron are introduced therein, small transversal partitions are soldered to the first, so as to obtain small cubes of the required size. 3. When the forms have been prepared as set forth in 1 and 2, the liquid sugar is run thereinto in the same manner as this is done for square or conic loaves, they are then clarified and dried as set forth in the patent. 4. When the sugar is dry, the four small boards mentioned in No. 1 are successively removed and the sugar bars become free in the mould, from whence they are taken away to be cut into small cubes for the retail trade.

5. This operation can be effected by means of forms, whose width is greater than its length, that is to say, they must not be square, and in this case one board only instead of four is introduced into the form, but it must be thick enough so that when it is removed the sugar bars have enough play to be detached and become free.

69797. L. Cezard, Brussels. *Improvements in the rapid refining of sugar.* 3rd August, 1885. The inventor claims a process of quick refining which consists in boiling in vacuo the syrups resulting from filtration, with the least possible quantity of crystallization water; in continuing the refining by keeping a certain time in a heated or non-heated reservoir, the sugar mass at a temperature of 30° to 40° centegrade, draining the paste obtained on frames of metallic wire cloth, so as to remove the greatest possible quantity of syrup, then filling the moulds with the juice and submitting it to the action of the centrifugal assisted by steam.

69835. C. E. Monceaux, Brussels. *Improvements in beet root sugar.* 5th August, 1885. The inventor claims a process of extracting sugar from saccharine matters, said process comprising the following principal operations, the union and combination of which form its distinctive character. 1st. Preliminary treatment of the substances (reduced preferably in small parts) by water at a temperature of about 45° to 50° centigrade for the purpose of eliminating by exosmose all or nearly all the salts contained in the cells submitted to the operation. 2nd. Subsequent treatment of the substances from which the noxious salts have thus been removed by water or juice at a temperature of about from 70° to 80° centigrade for the purpose of extracting by exosmose as completely as may be wished the syrup which remains alone or nearly alone in the cells; this syrup can afterwards be evaporated and boiled by suitable means.

69845. J. Savary, Brussels. *Improvements in apparatus called "Osmogens."* 6th August, 1885. The feeding of each frame, both with water and molasses, is rendered equal and regular. By means of an inlet funnel in two parts, which prevents the simultaneous re-entrance of water and air bubbles in the apparatus and keeping at the same time its surface free from agitations. By enlarging in a nearly tenfold proportion the water inlets and outlets. The enlargement of the section of these openings has for its object to decrease as much as possible and to reduce to almost nothing the head of liquid at its entrance into the frames.

69902. A. NUGUES and A. VIVIEN, Brussels. *Improvements in the manufacture of crystallizing sugar.* 13th August, 1885. The inventors claim. 1st. The purification of the liquors by the elimination of the salts that are insoluble. 2nd. The crystallization of the sugar by supersaturation by increasing the alcoholic degree either by mixture or by removing the water in one or several operations. 3. The recovery of the sugar from the mother liquor by precipitation in the state of saccharate.

69949. G. DUROZAD, Saint Josse-ten-Noode. *Improvements in the manufacture of sugar with amylaceous and cellulosic substances.* 21st August, 1885. This invention has for its object new processes for the manufacture of sugar by means of all amylaceous or cellulosic matters, starch, roots, tubercles, or plants containing these substances. In these processes no acid is employed, consequently the sugar obtained can crystallize without being inverted. To obtain a more economical production potato starch is used, and 25 per cent. of it mixed with 65 per cent. of water. This mixture is introduced in a boiler or digester and boiled under a pressure of four atmospheres, care being taken not to exceed the temperature of 125 degrees. From this digester the mixture is extracted either by a suction apparatus or by pumps, and led by coolers into backs where it is left to cool down to a temperature of 45 degrees centigrade, 10 per cent. of brown kiln dried malt is added whilst stirring, then the mixture is left to itself for two hours. The syrupy liquid leaving the backs is received in a vacuum evaporating apparatus. The temperature of evaporation is not to exceed 65 degrees centigrade. When the syrup beads it is withdrawn and left in moulds to crystallize, and afterwards submitted to the action of a centrifugal as in the case of ordinary sugar.

69996. J. PUVREZ DE GOULART, Brussels. *Process for filtering the juice extracted from beetroot, cane, etc.* 25th August, 1885. The inventor claims as his invention:—1. The principle of the apparatus, which can be defined theoretically as follows:—A given liquid of any kind is to be separated from the solid substances which it contains. A first purification called "separating" is effected on a filtering surface of any kind made of metal or of textile material, then a second operation called "filtration" is effected on a substance more closely grained than the first, and which retains all the infinitesimal substances which were not retained in the first operation. A third operation is afterwards effected on a substance still more closely grained than in the second case, and so on, the filtering being repeated as many times as will be necessary to obtain the perfect limpidness of the liquid. 2. The possibility of succeeding in effecting all these operations in the same apparatus without the liquids coming in contact a single instant with the air.

70031. A. Ralu, Brussels. *Improvements in the manufacture of solidified and debased syrups and molasses fit for distillation.* 27th August, 1885. The invention has for its object the manufacture of solidified and debased syrups and molasses, and more especially those from cane sugar and sorgho by means of mealy, starchy, or amylaceous substances incorporated therein.

70036. H. Leplay, Brussels. *A process of utilizing crystallisable sugar for vintage purposes.* The inventor claims as his invention for vintage purposes the application of various processes for the transformation of crystallizable sugar into grape sugar with a view to utilizing it for vintage purposes. 1st. The grinding and mixture of sugar in powder or in the granulated state, either at the ordinary temperature or at a higher temperature with more or less ripe grapes, or with the juice of green grapes, or with dry grapes, or the liquid formed by the maceration of the latter in water, or with the yeast produced during the fermentation of grape wort, or with leaves, grape cakes, wine lees, green shoots, green vine leaves. 2nd. The use of beer yeast for this purpose. 3rd. The use of more or less ripe apples and pears, or of the products derived therefrom, of oranges, lemons, cedrats, and other fruits.

70176. G. Fritsche, Brussels. *Improvements in processes for the clarification of beet root juice.* 11th September, 1885. (Patent of addition to main patent of the 20th November, 1884.) The inventor claims in the clarification of sugar the application of a produce of the groups of phenyl (phenythydride) as well as a fixed produce of the series of fluid gases converted into an intimate mixture and in combination with a reagent of aluminous earth and lime, and also with lime alone.

AMERICAN.

63046. H. D. Winton, Wellesley Hills, Norfolk, Mass., U.S.A. *Improvements in moulding presses for cubic sugar.* March 2nd, 1887. The stamps are arranged in circular rows behind the moulds, and set in motion each by a common rod, raised and depressed by the teeth of a ratchet wheel, which can be shifted. Below the circular rows of stamps is an endless strap, provided with distributing plates. A shifting device receiving a to and fro motion by means of a spring and cam plate is so contrived that the cubes of sugar delivered when the moulds occupy their lowest position, leave the apparatus in a methodical manner, and those which might be badly formed are rejected.

ABRIDGMENT.

382314. Milton Matthews, of Warren, and Henry Hill, of Chester Cross Roads, Ohio. *Evaporating pan.* May 8th, 1888. Consists of an arrangement of furnace and pans for evaporating sugar solution, &c. The furnace is open at top and divided by flanges placed longitudinally, one pan fitting between each pair of flanges. Communication may be established between each pan and the next by means of telescopic tubes at the end of each, in such manner that the tubes forming such union also act as a common axis for tilting any of the pans. Each pan or tray is provided with a longitudinal division. It has also a handle attached to its front edge for use in tilting or lifting.

382966. Andreas Frietag, of Amsterdam, Netherlands, assignor to Naamlooze Vennootschap Wester-Suiher-Raffinaderig, of same place. *Centrifugal machine.* May 15th, 1888. More especially for crystallizing and drying sugar. Consists of an outer circular or annular drum revolving on a vertical axis, whose outer periphery is finely perforated. A small inner chamber with perforated sides admits of the claying or other material, being fed into the mass in the drum, and also of hot air for drying purposes. The outer chamber or annulus is divided into a number of radial compartments by sliding vertical partitions, between which partitions the sugar crystallizes into flat cakes. Sometimes the plates are provided with parallel projecting ribs, which nick the sugar ready for breaking by hand or otherwise. Said plates have handles above, and laterally projecting flanges below, which admits of them being lifted from the machine with the dried sugar between them.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

January 1st to May 31st, 1887-1888.

Board of Trade Returns.

IMPORTS.

Raw Sugars.	Quantities.		Value.	
	1887.	1888.	1887.	1888.
	Cwts.	Cwts.	£	£
Germany	3,067,224	1,585,829	1,646,060	1,075,362
Holland	159,941	121,149	87,481	83,518
Belgium	423,283	348,620	218,391	229,830
France	9,207	2,070	5,485	1,690
British West Indies & Guiana	1,112,546	1,090,074	809,778	890,281
British East Indies	103,960	354,958	48,380	172,745
China and Hong Kong	312	....	201	....
Mauritius	55,440	95,283	28,560	69,731
Spanish West India Islands	31,511	260,424	19,292	104,037
Brazil	348,087	1,630,064	181,848	1,037,818
Java	1,765,018	2,057,537	1,163,024	1,579,746
Philippine Islands	128,624	216,282	58,936	110,659
Peru	177,938	210,848	110,550	160,084
Other Countries	237,306	247,640	136,227	178,409
Total of Raw Sugars	7,620,397	8,220,778	4,514,213	5,783,910
Molasses	137,859	136,321	42,671	43,110
Total Sugar and Molasses	....	....	4,556,884	5,827,020
Refined Sugars.				
Germany	1,151,943	1,303,261	884,609	1,137,611
Holland	549,442	490,463	426,745	451,934
Belgium	70,863	93,499	58,796	89,442
France	586,521	369,492	437,966	335,150
United States	571,876	25,697	457,496	24,163
Other Countries	64	200,745*	37	155,717*
Total of Refined	2,930,709	2,483,157	2,265,622	2,194,017

EXPORTS.—Refined Sugars.

	Cwts.	Cwts.	£	£
Sweden and Norway	29,781	20,784	20,230	17,641
Denmark	45,908	29,298	24,725	21,372
Holland	25,756	32,494	16,682	24,162
Belgium	19,225	9,913	11,609	7,457
France	19,051	2,375	11,672	1,717
Portugal, Azores, & Madeira	51,036	36,326	28,773	27,033
Italy	38,493	35,019	23,178	26,065
Other Countries	80,501	67,888	52,704	55,433
Total of Refined	309,752	234,097	189,573	180,880

* Imported entirely from Russia.

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of May, 1888, compared with the corresponding month of the two preceding years, and the average monthly imports for the year compared with those of 1885, 1886, and 1887, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

Countries from which Sugar has been imported.	"LUMPS AND LOAVES."							"OTHER SORTS." Including Crushed Loaf, Granulated, Crystallized, &c.							TOTAL.						
	Monthly Average.				May.	May.	May.	Monthly Average.				May.	May.	May.	Monthly Average.				May.	May.	May.
	1885	1886	1887	1888	1886	1887	1888	1885	1886	1887	1888	1886	1887	1888	1885	1886	1887	1888	1886	1887	1888
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
France	1597	1462	1363	1868	1528	1561	1778	463	2688	5099	1827	690	4376	2202	2060	4150	6462	3695	2218	5937	3980
Holland	3848	3508	3780	2496	3794	3692	3518	1472	1428	2483	2408	920	1834	1995	5320	4936	6263	4904	4714	5526	5513
Germany & Austria	808	990	1347	1488	1345	2123	1541	3262	6634	10463	11545	6975	7636	16351	4070	7624	11810	13033	8320	9759	17892
Belgium	189	344	592	697	384	507	517	120	113	308	238	122	331	161	309	457	900	935	506	838	678
United States	707	854	454	9	660	690	23	8869	5078	2804	248	3426	10095	727	9576	5932	3258	257	4086	10785	750
Russia	..	..	3	..	..	..	..	875	3412	452	2008	2858	..	418	875	3412	455	2008	2858	..	418
Other Countries	1	..	..	..	..	..	..	24	9	15	..	41	..	..	25	9	15	..	41	..	..
Total	7150	7158	7539	6558	7711	8573	7377	15085	19362	21624	18274	15032	24272	21854	22235	26520	29163	24832	22743	32845	29231

SUGAR STATISTICS—GREAT BRITAIN.

To June 23rd, 1888 and 1887. In Thousands of Tons, to the nearest Thousand.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1888.	1887.	1888.	1887.	1888.	1887.
London	69	84	135	151	149	159
Liverpool ..	141	95	133	123	190	142
Bristol	3	4	24	30	23	30
Clyde	44	55	113	107	114	126
Total ..	257	238	405	411	476	457
	Increase..	19	Decrease..	6	Increase..	19

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

For the four principal Ports. In Thousands of Tons, to the nearest Thousand. For May, 1888 and 1887.

	STOCKS. June 1st.		DELIVERIES. In May.		IMPORTS. In May.	
	1888.	1887.	1888.	1887.	1888.	1887.
New York	120	132	57	85	77	125
Boston	16	21	20	25	26	29
Philadelphia....	5	4	19	16	20	19
Baltimore	..	..	..	..	..	..
Total......	141	157	96	126	123	173
	Decrease..	16	Decrease..	30	Decrease ..	50
Total for the year (1888)..			405	533	499	588

For New York Prices for Sugar, June 14th, 1888, see page 378.

Stocks of Sugar in the Chief Markets of Europe on the 31st May, for Three Years, in thousands of tons, to the nearest thousand.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts*.	Total 1888.	Total 1887.	Total 1886.
246	160	12	*135	80	20	653	674	803

*Estimated.

Consumption of Sugar in Europe for Three Years, ending 31st May, in thousands of tons, to the nearest thousand.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts*.	Total 1888.	Total 1887.	Total 1886.
1222	401	46	447	214	338	2668	2718	2446

Estimated Crop of Beet Root Sugar on the Continent of Europe for the present Campaign, compared with the actual crop, of the three previous Campaigns.

(From Licht's Monthly Circular.)

	1888-89. Tons.	1887-88. Tons.	1886-87. Tons.	1885-86. Tons.
France	425,000	405,000	486,483	298,407
German Empire	975,000	925,000	1,018,842	838,131
Austro-Hungary	495,000	412,500	523,060	377,032
Russia and Poland.	430,000	430,000	479,582	537,860
Belgium	160,000	135,000	132,570	88,421
Holland	43,000	36,000	32,263	21,244
Other Countries	62,000	56,050	56,050	55,500
Total	2,590,000	2,399,550	2,728,810	2,216,595

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

The sugar market, both for raws and refined, as compared with May, shows a marked improvement in tone, and for beet 88% and for refined generally, in values. German 88% is now 14s. per cwt., and some kinds of refined are up 1s. per cwt. Cane sugars are very firm, without much variation in prices.

The imports of foreign refined for the first five months of this year show a decrease, upon 1887, of 22,397 tons; the imports from the United States have fallen off by 27,307 tons; from France, 10,848 tons, and from Holland, 2,949 tons. On the other hand Germany shows an increase of 7,567 tons; Russia, 10,034 tons; Belgium, 1,133 tons.

The deliveries into the United Kingdom (four principal ports) up to June 23rd show a falling off, as compared with 1887, of 6,677 tons, whilst the imports have increased by 19,373 tons.

The stocks in the United Kingdom, on June 23rd, were 256,985 tons, as compared with 237,430 tons in 1887, or an increase of 19,555 tons.

Present quotations for the standard qualities, as under, are :—

	FLOATING.		Last Month.
Porto Rico, fair to good Refining	13/– to 13/6	against	13/3 to 13/9.
Cuba Centrifugals, 96°/₀ polarization	14/9	,,	15/–.
Cuba Muscovados, fair to good Refining..	13/– to 13/6	,,	13/3 to 13/9.
Java, No. 15 to 16, good to strong	15/6 to 15/9	,,	15/3 to 15/9.

	LANDED.		Last Month.
Madras Cane Jaggery..	9/-	against	9/– to 9/6.
Manila Cebu and Ilo Ilo	9/– to 9/6	,,	9/– to 9/6.

Paris Loaves, f.o.b...	18/–	against	17/3 to 17/9.
Titlers	20/3	,,	19/3
Tate's Cubes	21/3	,,	20/6
Austrian-German Beetroot, 88 °/₀ f.o.b.	14/-	,,	13/1½ to 13/3.

THE
SUGAR CANE.

No. 229. AUGUST 1, 1888. Vol. XX.

☞ The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to Henry Thorp, Ducie Chambers, 57, Market Street, Manchester.
For Scale of Charges for Advertisements, see page xi.
For Table of Contents, see page iii.

M. Duponchel, in the *Revue Scientifique* of the 14th July, calls attention to the alternation of atmospheric variations recurring every 12 years, and would assign to the current year abnormal conditions of mean temperature analogous to those observed in 1864 and 1876. In both these years the production of sugar was 25 per cent. below the average, and in 1876, before the end of October, the price had run up to a figure which is still remembered.

The following is from the *Economist* (New York correspondent, and dated July 27th):—

"Following close upon the heels of the corner on June coffee, a fortnight ago, comes something very like a corner in sugar. For some months past, Mr. Claus Spreckels, of San Francisco, has been antagonizing the Sugar Trust. He came east, and decided to build a sugar refinery at Philadelphia, with which to fight the real or would-be cornerers of the sugar market. Whether that was a flank movement or not, I do not know, but as currently reported, it now appears that he has 50,000 tons of raw Manila product—all there is in the market. Meanwhile the Trust refineries have gone ahead as merrily as butterflies, contracting to deliver refined at a fixed price, based upon the recent price of raw. Now it is found that the supplies of the raw are limited—that Mr. Spreckels holds the bulk of the available stock. The price of refined advanced 1¾d. last week, and promises to go as much higher at an early day."

On the 21st ult., the United States House of Representatives passed the Mills Tariff Bill by 162 votes to 149. By this bill it is proposed to reduce the duty on sugars by 20 per cent. It now remains for the Senate to confirm, amend, or reject. If any bill at all is passed this year, there can be no doubt that a considerable reduction will be made in the duties upon sugars. On the 25th, the Republican Senators, in caucus, unanimously agreed, after many hours discussion, to prepare a Tariff Bill, as a substitute for Mr. Mill's bill. Some of the leading members declared their belief that the sentiment of the country was so strongly in favour of a tariff reform, and surplus reduction, that it would be a suicidal blunder for the Republicans to evade the issue brought before the people simply as opponents of the President's policy. As one senator put it, the Republican party cannot afford to run away from the issue and pose as opponents of tariff reduction.

The details of the proposed bill were not much discussed, but it is likely to be an extremely moderate measure, revising certain inequalities in the present tariff, and reducing the revenue *by cutting down the sugar duties fifty per cent.*, and abolishing the tax on tobacco and alcohol used in the arts. It was estimated that a reduction of from 65 to 80 dollars would thus be effected.

The following shows the results of the working of German and other European sugar factories and refineries, for the campaign 1887-88:—

Oschersleben shows a gross profit of M. 55,233, of which M. 3,000 are carried to the reserve fund, the remainder being written off. *Lehrte* has made a net profit of M. 25,960. *Hoiendorf* divides M. 108,900 among the shareholders. *Klützow* has made a net profit of M. 104,183; whilst *Hasede Förste* shows a loss of M. 11,844. *Strassburg u/M.* is able to pay a dividend of 11¾%, after writing off last year's loss, amounting to M. 91,052; and *Stavenhagen* declares a dividend of 11%, whilst *Broistedt* has just been able to pay off its debts, and *Weetzen* is only 1¼ mark to the good.

At *Hadmersleben* the net profit is M. 54,790; at *Wierzchoslawice.* M. 103,561 (over 10% on the share capital); at *Weferlingen*, M. 237,738; at *Wierthe*, M. 121,082; at *Schladen*, M. 312,892 (38% on the share capital). The *Mescherin* factory declares a dividend of 10%, while that of *Wallwitz* is able to pay M. 5,000 per share, equal to 100%!

On the other hand, at *Sobbowitz* the gross profit is almost entirely absorbed by sinking and reserve funds, whilst *Oldesloe* has lost over

M. 14,000 this year. At the *Lippische Fabrik*, at Lage, a dividend of 9% is declared; *Wabern* shows a net profit of M. 113,229; *Vechelde*, M. 125,524; *Oestrum*, M. 22,541; and *Königslutter*, M. 175,223 (against a share capital of M. 592,500).

In Belgium the *Grand Pont* Factory and Refinery, at Hongaerde, shows a profit of fr. 57,333, on a share capital of fr. 400,000, whilst the *Schooten* Factory, with a capital of fr. 250,000, has lost fr. 98,157. That of *Feluy-Arguennes* has paid off fr. 100,000 of its debt, and carries fr. 5,744 to the credit of next year's account.

The *Wester-Suikerraffinaderij*, of Amsterdam, shows a still worse result than last year, the margin between raw and refined sugar being less than in the previous campaign, and although the result is not regarded as satisfactory, considering the circumstances, no dividend can be paid. The last two months of the current year have shown an improvement.

The *Danske Sukkerfabriker*, at Copenhagen, which lost in 1884-85, 671,906 kroner; in 1886-87, 185,077 kroner; and in 1885-86 made a profit of 100,072 kroner, shows this year a profit of 587,693 kroner, equal to about £32,650, which allows the payment of a dividend of 4%.

Mr. Santiago Dod has recently published a paper on "Diffusion practically considered," which is an important contribution to the discussion of this still open question. The value of the paper is its all-roundness. We are only able to give about one-half of Mr. Dod's paper in the present number; the other half will appear in September. (See page 418.)

Experiments in Diffusion are being made by the Magee Sugar Company in the Hawaiian Islands, under the management of Colonel Z. S. Spalding. Mr. Logan has furnished the *Hawaiian Gazette* with a description of what he saw of this process as there carried on; whilst pointing out its advantages, Colonel Spalding did not withhold from Mr. Logan some of the drawbacks. (See page 432.)

We have received the first number of *The Louisiana Plánter and Sugar Manufacturer*, a weekly paper devoted to Louisiana agriculture in general, and to the sugar industry in particular, in all its branches, agricultural, mechanical, chemical, political, and commercial. Amongst the stockholders are the leading planters and sugar experts in Louisiana.

In the Demerara *Argosy*, received by the last mail, is an interesting summary of the report of the Comptroller of Customs and Rum Duties, and Registrar of Shipping (N. Darnell Davies), on the Commerce of British Guiana in 1887, and contains some striking statistics in relation to sugar.

The following table shows the exports in bulk and value of sugar for the past 8 years. As every one knows, sugar and rum are the staple productions of this colony:—

	Tons of Sugar.	Value of Sugar, Rum, and Molasses.
1880	97,683½	$11,229,201·00
1881	92,309	11,414,974·82
1882	124,102	14,319,126·07
1883	116,635¾	14,197,816·00
1884	125,322	$10,184,027·30
1885	96,058½	7,805,414·61
1886	111,855	8,002,083.97
1887	134,874½	9,516,053·08

If we take the year 1883, which was the year previous to the ruinous fall in values, caused by the large over-production in Germany,—*the direct result of the unnatural system of State bounties*,—we see that the exports of sugar were 116,635¾ tons, and the value, including rum and molasses, $14,197,816. In 1887 the exports had slightly increased, which speaks volumes for the pluck and energy of our planters there, when we consider the enormous reduction in values. The quantity exported in 1887 was 134,874½ tons, whilst the value, including rum and molasses, was only $9,516,053, or a minus difference as compared with 1883 of $4,681,763. Had this difference been the natural result of the law of supply and demand, our planters would have no just cause for complaint, but like others, would have had to take the rough with the smooth.

This shrinkage in values between 1883 and 1887 cannot wholly be set down to bounties, for other produce have fallen considerably in value; but it will be quite within the mark to say that fully one-half of this depreciation is the direct result of the State aid given by European Governments to the manufacturers of beetroot sugar.

The new regulations with regard to the levying of duties on sugar in Germany come into force on the 1st of the present month. The principal changes are the reduction of the tax on the beets, from 17s.

(Continued on page 447.)

THE ELECTRIC SUGAR REFINING COMPANY.

The operations and prospects of this company are exciting an interest outside of sugar circles. In a recent number *The Scotsman* devotes a column and a quarter to an historical account of the venture, the greater part of which is pretty much what has appeared in *The Sugar Cane* at different times during the past three years.

The last two paragraphs, however, contain some statements which are fresh; such as that a proposal has been made to a syndicate of Liverpool gentlemen, who have organised a company to purchase all rights for Great Britain, and certain of our Colonies; that there is a prospect of a factory being started in England; also that negotiations have been opened with the leading refiner in Paris for working the process in that country. It says:—

"The unexpected death of the Professor (the inventor) has, however, quite altered the policy of the Company. While he was alive, as he held 6,000 out of the 10,000 shares into which the capital of the Company was divided, he was practically master of the situation, and could do pretty much as he pleased; and his peculiarities of disposition were responsible for much of the delay that took place in starting the concern, and which had greatly irritated the whole body of the shareholders. After the inventor's death, and with the full consent of his widow, the policy of the Company as regards secrecy was so far reversed that a proposal was made to a syndicate of Liverpool gentlemen, who organised a company to buy the electric process for operation in Great Britain and certain British colonies. Other steps of a similar kind were taken, and there is a prospect of a factory being opened in England.

"It would thus appear that we are about to witness a remarkable revolution in one of our most important industrial processes, the full results of which it is impossible to foresee. It is also premature to anticipate what effect this extraordinary invention may have upon the pernicious bounty system introduced by several foreign countries, but it is significant that already negotiations have been opened with the leading refiner of France, with a view to the introduction of the electric process into that country."

ON THE PRODUCTION OF PURE GRAPE SUGAR BY THE CORDS-VIRNEISEL PROCESS.

By Dr. Edmund O. von Lippmann.

By the Cords-Virneisel process starch is transformed into pure crystallized grape sugar, or the raw products, especially potatoes, are made use of directly for the production of sugar, without being previously converted into starch. This is effected either by inversion by means of acids in attenuated solution (corresponding to Soxhlet's postulate), or by extraction by lixiviation of the raw material, sufficiently finely divided, with acidulated water, after the manner of the diffusion process. During the last campaign I had an opportunity of becoming acquainted with the result of this manufacture (now materially improved, after overcoming very great initial difficulties) in practical operation, and of conducting some analyses of the products obtained.

The manufactory in question has tried the two processes abovementioned on a large scale. Nearly the same quantitative result was obtained from working up potatoes direct, as from the employment of a corresponding quantity of starch, but the quality was not satisfactory, at any rate with the very imperfect means employed, inasmuch as they did not succeed in getting rid of certain dark extractive substances of an unpleasant taste, and not at all fixed, nor to be removed by further purification without great loss. Until this method of working has been much improved, the first-mentioned process, that of producing very pure starch, and then obtaining the grape sugar from it, will have to be adhered to.

The product obtained at the time of my being there, at the rate of many cwts. weekly, was in granulated crystals, fully equal in outward appearance to the lower sorts of granulated beetroot sugar. It was light yellow in colour, and consisted of grape sugar anhydrid, and hence was capable of being perfectly dried at 212° to 230°, without decomposition or liquefaction. In contradistinction to what is usually the case with starch sugar, somewhat lower figures were obtained by polarisation than by reduction, which would indicate an absence of active dextrine, and show a high degree of purity. The analyses were conducted by Mr. Staudinger, the chemist of the Rositz Sugar Refinery, in three ways—by polarisation, by reduction, and by fermentation—and in addition, the proportion of the bi-rotation to the normal rotation (ascertained later) was taken into account, which likewise permitted an estimate of the purity. The figures obtained from the polarisation and the reduction agreed on the whole very well, but those obtained by fermentation showed a variation of 1½ per cent. from the average of the others, although attempts were made by parallel experiments with pure dextrine, to reduce the differences as much as possible. According to the statements recently made by Jodlbauer, this fact will not cause surprise. If we are content to take the average figures from the best determinations by all three methods, which, of course, cannot lay claim to scientific exactness, then we find the first product to contain 94·78 per cent. of sugar and 0·78 per cent. of ash, and the second product, obtained from the syrup of the former, to contain 94·20 per cent. of sugar and 0·82 per cent. of ash. The second product was defective in crystallisation, and also contained somewhat more organic matter. The cause of the large quantity of ash was mainly bad lime and insufficient mechanical apparatus, and after a time these defects were successfully removed, and a considerably purer sugar, especially as regards the percentage of ash, was obtained.

During the Easter holidays a trial was made by refining 200 cwt. of this better sugar at the Rositz Refinery. The solution was filtered over 60 per cent. of good bone black, the result being that it was deprived of its colour to a really surprising extent, and converted into a syrup of most agreeable taste (the pure honey sweetness), and it was then at once boiled. The remarkable and hitherto unknown fact was revealed, that this syrup could be granulated by boiling in vacuo, and hence, for the first time it was proved on a large scale, that grape sugar syrups of a sufficiently high degree of purity can be boiled down to crystals exactly like beetroot syrups. After two or three drawings already a very regular granulation of quite small hexagonal foliation (dextrose-anhydrid) takes place, which further increases in the usual manner, and results in very fine regular crystals.

The syrups are, however, extraordinarily sensitive to the effects of heat, for which reason the boiling was done in a Hallström tubular vacuum, without worm. The inventor of the process, following his experience, had advised that the concentration should in this experiment be carried to a tolerably high degree. This, however, proved to be a mistake, for the *masse-cuite* crystallised so firmly and quickly that, after cooling, it was impossible to get the blocks in a perfect state out of the vats and to centrifugal them. This could only be done in the case of some of the vats which had remained warm the longest, and so a dry, light yellow, beautifully crystallised mass was obtained. As in the meantime the regular work of the refinery had been recommenced, nothing could be done but to dissolve once more the remainder of the *masse-cuite*, and after a simple filtration through a filter press, boil it again. This heating proved very injurious, for the syrup became darker, smelt as if burnt, and would not again granulate. After cooling the mass, however, crystallised well, and could be centrifugaled, and also, by way of experiment, clarified. In this manner a hard white sugar was obtained, which certainly still showed a yellowish tinge, but which, in regular undisturbed working, can undoubtedly be produced in irreproachable quality.

The question, whether this would be technically and financially profitable, must still remain in suspense. Considering the inevitable loss accompanying each reboiling and heating, it would seem advisable to produce at once a raw sugar of high percentage of purity, such as would make it applicable for all industrial purposes and which could not be materially further increased. According to the average figures referred to above, the dextrose raw sugar employed contained 95·74 per cent. of sugar, 3·32 per cent. of water, 0·29 per cent. of ash, 0·65 per cent. of organic matter (the degree of purity being 99·02); the *masse-cuite* contained 85·41 per cent. of sugar, 13·36 per cent. of water, 0·20 per cent. of ash, 1·03 per cent. of organic matter (degree of purity 98·58); the white sugar contained 99·64 per cent. of sugar, 0·19 per cent. of water, 0·04 per cent. of ash, 0·13 per cent. of organic matter (degree of purity 99·83). The ash consisted always of a relatively large portion of magnesia, probably because this substance unites chemically with grape sugar. The fact that the *masse-cuite* shows a somewhat lower degree of purity than the raw sugar is explained by the setting in of decomposition, a consequence of the heating and boiling. This phenomenon, accompanied by difficulties and losses in refining, also presented itself in an increased degree in an attempted conversion (undertaken in the factory itself) of the sugar which was obtained direct from potatoes. If, after all, the latter mode of working should be persisted in, the direct production of a high per cent. raw sugar will be equally advisable in this case.

As it is stated that there is an expectation of dextrose raw sugar being used in large quantities in the manufacture of fermented liquors, especially for improving wines, it is important to possess accurate details with regard to the fermentability of the after products of dextrose, and therefore the comparison of an analysis of crystallised dextrose sugar, product No. 3 of the above-named factory, with one of ordinary pure starch sugar may be of interest. The former showed:—16·69 per cent. of water, 0·82 per cent. of ash, dextrose—by reduction 81·24 per cent.—by fermentation 81·00 per cent.—by polarisation 75·44 per cent. The latter gave 22·67 per cent. of water, 0·19 per cent. of ash, dextrose—by reduction 68·36 per cent.—by fermentation 68·58 per cent.—by polarisation 119·84 per cent. (sic). It is very remarkable that in the case of dextrose raw sugar the test by polarisation gives 5·18 per cent. less than the mean of the other tests. That the polarising substance was really dextrose of a high degree of purity is best shown by the bi-rotation proportion, which was found to be 100 : 56·73, against 100 : 85·01 in the case of the starch sugar. If we consider 75·44 as the actual saccharine content of the dextrose sugar, and 68·47 as that of the starch sugar (the mean between 68·36 and 68·58) then we get the following statement of the composition of the two sorts. The dextrose sugar contains 75·44 per cent. of sugar, 16·69 per cent. of water, 0·82 per cent. of ash, 7·05 per cent. of organic matters, of which 5·68 per cent. is susceptible of fermentation and reduction. The starch sugar contains 68·47 per cent. of sugar, 22·67 per cent. of water, 0·19 per cent. of ash, 8·67 per cent. of organic matters, which have a high degree of polarisation, but neither ferment nor reduce; of 100 parts of the dry substance 97·39 and 88·54 parts respectively are fermentible. The whole of these figures of course have only a technical and not a scientifically accurate value.

From what has been stated it is evident that the question of the production of pure crystallised grape sugar, from a technical point of view, is in principle solved. If the large sale for this product, which is anticipated, be attainable in the manner expected and in a short time, it will no doubt pay to carry on the manufacture on a large scale and with more perfect mechanical appliances than those hitherto used. It is said that arrangements to this end have already been made in different quarters.—Translated from the *Cöthen Chemiker-Zeitung.*

Mr. E. E. H. FRANCIS ON CANE CRUSHING.

The following is the full text of the paper on this subject, recently read by Mr. Francis, Government Analytical Chemist, before the Demerara Royal Agricultural and Commercial Society, for which we are indebted to the *Demerara Chronicle*:—

As a contribution to the discussion on cane mills raised by Mr. Skekel, I beg to call attention to what appears to me to be a remarkable and an important point bearing on the subject, namely, that the percentage of juice obtained by crushing is not altogether a function of the power of the mill, as it is usually assumed to be; nor, a fixed power being given, is it wholly dependent on the proportion of fibre (or juice) existing in the cane. At any rate, those are the conclusions that I have arrived at from the results of a large number of experiments made at the Government Laboratory—a table of which I have the honour herewith to present to the Society.

The mill used in the experiments was specially made for the Laboratory at the Demerara Foundry. It has three rollers of dimensions of 6 inches by 4 inches, which are turned by two powerful cranks acting directly on the upper or middle rollers—motion being communicated to the two lower ones by means of cogs. I submit a drawing for inspection.

For feeding the mill the canes are cut into three or four lengths, each of these being then split in halves lengthways. The pieces are first run through the mill singly, then placed in pairs and passed through again with the rollers set closer, and so on a third or fourth time until no more juice can be obtained. By first weighing the cut canes and then the megass, the proportion of juice extracted is ascertained, and the whole operation occupies about 10 minutes. To determine the amount of fibre, the megass is alternately soaked in water and then passed through the mill, until all remaining sugar and other soluble matters are removed. The fibre, squeezed as dry as possible, is then tied up like a parcel in a sheet of filtering paper, and kept in a hot-air oven at a temperature of 100°—105° each until it ceases to lose weight. This takes about four days. Finally, the fibre is completely burnt, and the weight of the ash deducted.

The procedure is practically the same in all cases; nevertheless, it will be seen from the table that the expression varied from 50·4 per cent. with sample 6, to 79·3 per cent. with sample 56, thus showing a difference of 28·9 per cent. in the crushing, although the proportion of juice in the two samples of cane differs by less than 5 per cent. Such a difference as these two samples afford is, no doubt, very exceptional, and may even be due to an error in the determination, although I can find no evidence of that being the case.

Apart from these examples, however, numerous others will be found in the table, where the proportion of fibre is nearly or quite the same, yet the crushing results very largely, as, for instance, with samples 1 and 2, 11 and 12, 17 and 19, 28 and 29, 58 and 67. In each case the proportion of juice yielded by grinding varies between 10 and 15 per cent., and the lower result is given by the cane containing the greater amount of juice.

I meant to have brought this matter to the notice of the Society at the last meeting, but as the results had been obtained only in the regular way of analysis, and were not intended to prove any such point as the one in question, I thought it better to postpone my communication until I had made some special experiments with as great care and under as similar conditions as possible. Owing to the long time required to dry the fibre, only a few of these have been completed, but as far as they go, they fully support the conclusions previously arrived at.

In making these special experiments, the adjustment of the rollers of the mill remained unaltered throughout. The same two men were employed at the cranks (I being one), and the megass was squeezed and re-squeezed until no further juice could be extracted—the final squeezing being done with the megass in layers thick enough to require the utmost available power to get it through the mill. The crushing was performed in duplicate by using only half a cane for each experiment. Table II. gives the results obtained.

Being so few in number the results do not exhibit the striking differences met with in previous table, still they go a long way towards substantiating them. Thus, by comparing samples 1 and 3, and 4 and 7, it will be seen that both pairs differ to about the same extent in the amount of juice they contain, but, in the crushing, the former differs by only 2 per cent., and the latter by no less than 11 per cent. Samples 4 and 5, also, while containing practically an equal amount of juice, differ by about 10 per cent. in the amount they yield.

I am not prepared to say definitely why different canes containing the same amount of woody matter should vary so largely in the quantity of juice they furnish; but think it probable that it may depend on the proportion of vascular tissue and cellular tissue respectively present. Cane containing the larger number of fibro-vascular bundles in a given area, being possibly more difficult to grind than those containing fewer, whilst the actual amount of wood in each may be the same. I think, however, the matter well deserves further investigation.

Annexed to the paper were the subjoined explanatory tables:—

Table I.

No.	Per cent. of Fibre.	Per cent. of juice in the cane.	Per cent. of Crushing.	No.	Per cent. of Fibre.	Per cent. of juice in the cane.	Per cent. of Crushing.
1	14·51	85·49	70·3	36	9·61	90·39	65·8
2	14·15	85·85	57·5	37	9·58	90·42	67·8
3	14·10	85·90	63·8	38	9·50	90·50	70·0
4	14·07	85·93	64·6	39	9·42	90·58	63·1
5	13·25	86·75	60·9	40	9·41	90·59	67·7
6	13·25	86·75	50·4	41	9·40	90·60	66·5
7	12·99	87·01	61·7	42	9·37	90·63	70·8
8	12·85	87·15	65·8	43	9·34	90·66	65·0
9	12·11	87·89	57·2	44	9·30	90·70	69·9
10	11·95	88·05	72·2	45	9·07	90·93	69·6
11	11·90	88·10	61·6	46	9·04	90·96	64·6
12	11·70	88·30	71·2	47	9·02	90·98	65·6
13	11·67	88·33	64·7	48	9·02	90·98	76·1
14	11·62	88·38	59·4	49	8·97	91·03	76·9
15	11·50	88·50	65·6	50	8·86	91·14	70·9
16	11·42	88·58	67·5	51	8·82	91·18	62·9
17	11·03	88·97	70·9	52	8·72	91·28	65·4
18	10·90	89·10	68·4	53	8·70	91·30	64·5
19	10·83	89·17	59·5	54	8·64	91·36	60·4
20	10·78	89·22	61·2	55	8·56	91·44	68·1
21	10·78	89·22	63·1	56	8·49	91·51	79·3
22	10·63	89·37	65·0	57	8·11	91·89	71·4
23	10·62	89·38	67·5	58	8·03	91·97	77·8
24	10·47	89·53	69·0	59	7·85	92·15	67·8
25	10·44	89·56	69·2	60	7·83	92·17	66·2
26	10·43	89·57	65·0	61	7·66	92·34	70·7
27	10·42	89·58	65·4	62	7·53	92·47	68·1
28	10·38	89·62	72·4	63	7·48	92·52	71·7
29	10·37	89·63	58·5	64	7·45	92·55	65·9
30	10·18	89·82	73·8	65	7·40	92·60	76·8
31	10·07	89·93	73·5	66	7·18	92·82	64·4
32	10·04	89·96	66·4	67	7·01	92·89	62·7
33	9·90	90·10	68·0	68	7·02	92·98	76·3
34	9·80	90·20	69·3	69	6·66	93·34	69·0
35	9·66	90·34	68·4	70	6·62	93·38	76·8

TABLE II.

No.	Per cent. Fibre.	Per cent. Juice.	Per cent. Crushing. 1st half.	Per cent. Crushing 2nd half.
1	14·54	85·46	61·6	62·8
2	13·70	86·30	62·9	60·4
3	11·89	88·11	63·8	64·8
4	10·00	90·00	65·8	65·2
5	9·58	90·42	75·5	75·4
6	9·26	90·74	69·8	69·7
7	7·72	92·28	76·9	76·5

THE SORGHUM INDUSTRY.

The following letter of Mr. Santiago Dodd, taken from *Colman's Rural World*, June 21st, has been sent to us for insertion :—

My attention has been called to an article in the *Sugar Bowl*, referring to one in your issue of the 10th of May, by W. P. Clement, containing a number of misconceptions which, if allowed to pass unchallenged, may effect adversely the nascent sorghum industry as well as that of Louisiana, where unfortunately, a class of "flat footed planters" very much out of place in the production of sugar, catch like drowning men at any straw which seems to offer the shadow of a pretext in favour of their obsolete practices, to tranquilize their minds with regard to their own impending fate.

Taking a deep interest in all that relates to the new industry, which I hope and believe will, if properly initiated, finally become an important factor in our national prosperity, I rob time from other tasks to take exception to some of Mr. Clement's conclusions, supposing my remarks may be of sufficient value to merit a place in your columns.

He says with great emphasis that "the theory of central factories is a very pretty theory, it is only a very pretty theory." No, if a long experience in other countries had left any room for doubt in this matter, so wild an assertion would be startling indeed; but under circumstances, it only shows how easy it is to err, in attempting to speak authoritatively upon so complex a question without a thorough knowledge of the subject in all the phases of so vast and varied an industry. If the author of so sweeping a condemnation of recognized principles, had been conversant with the organization of sugar production throughout the world, or with its history even, he would never have ventured upon such an unqualified remark. To prove this I shall begin by citing as succinctly as the subject will permit, the main facts in the historical phase of the question, in order to show conclusively that the plantation system was not developed by any of the inherent requirements or necessities of the manufacture *per se*, and that it was on the contrary, simply a natural and unavoidable consequence of that great error which most nations and races have committed in some form or epoch —the error of serfdom.

When the first attempts at sugar production were made in America, the sugar cane was the only available sacchariferous plant known, and the industry had of necessity to be initiated in tropical climates where cane could be produced. As no farming class existed in the West Indies, the manufacturer could not possibly purchase this raw material however much he might have been inclined to, in order to avoid the investment of a double amount of capital he must raise the cane himself or abandon altogether the enterprise. There was evidently no option in the matter, and the two branches of production were united, not from choice or because it was considered best, but only because no other organization was possible under the prevailing circumstances. White men would not emigrate to tropical countries to work for others, and no free labouring class existed there, consequently an inferior race of toilers was imported by force as slaves. These had to be worked under the lash in gangs, so that recourse could not be had to tenant farming in order to create a class of independent cane cultivators. The shape which the plan of manufacture assumed was due therefore to a perverted form of human labour, and the whole system became as vitiated as that upon which it was based.

The planter was neither a manufacturer nor an agriculturist in the true sense of the terms, but in reality a feudal lord, living at ease upon the unrequited labour of others. No special agrarian or industrial aptitude was requisite for putting the yearly earnings of some hundreds of bondsmen into his own pocket, and as a general rule he lacked both the ability and desire to improve his primitive practices. Most of the time of the managers was devoted to keeping the gang at work and preventing the negroes from running away or in hunting them down if they did, and little was left for studying the defects of manufacture and none for remedying them. No necessity was felt for increasing the profits by improvement as it was easier to do so by buying more slaves, as long as the coast of Africa was open to the demand, and when the supply was finally cut off, the planter bred instead of purchasing his labourers.

These facts are stated because they bear strongly upon the case, and not from any spirit of animadversion. The system was one of the many errors of the times, and as old as history itself. Any class of men educated in such a school would have done the same, and the feudal lord of the West Indies no more doubted the propriety of his course, than those old land pirates of Europe, the roistering, robbing, serf-holding barons of the middle ages did.

Scarcely any advancement was made or could be expected under such conditions, either in the factory or the field, until emancipation came to ruin and eject the least capable, and force the survivors to make some improvement to compensate the increased cost of production. Progress was nevertheless still very slow, and limited to those tardily adopted changes others devised, as the survivers were generally incapable of inventing anything for themselves, and always met proposed innovations with a pitying smile of complacent contempt for the suggestor. There is, I believe, no case on record of any successful invention made by a planter, and all those which he finally accepted have been thrust down his throat as it were, while adversity held open his jaws.

Notwithstanding the loss of its slaves, the plantation system was still continued, and the proprietor went on in his happy-go-lucky way, wasting about as much sugar as he sent to market; but, as we shall see in the sequel, if it outlived the serfdom which gave it birth, it was solely due to the fact that the tropics still enjoyed a complete monopoly of sugar production. When this advantage, which bolstered it up a short time longer, ceased, the "old plantation" came down with a crash, generally burying the owner in its ruins.

As a final consequence of all this inefficiency, the world grew tired of waiting upon the perverted evolutions of that industrial abortion, the plantation, to supply at anything less than the price of a luxury, a great staple which had become one of the common necessaries of modern life, and men more far-seeing and enterprising than the planter educated in a false school, began looking about them for some new means of supplying the demand.

The sugar beet had already shown its inherent capacity for a high development as a sacchariferous plant, and the despised root was taken up and scientifically nurtured 'midst the jeers and scoffs of the planter, who has from time immemorial had an unhappy faculty for deriding all that was new. The beet rose nevertheless from being a successful rival to the position of a triumphant adversary of the neglected tropical cane.

For the first time during the existence of sugar production a free, untrammeled, imperverted manufacture grew up under the guidance and control of legitimate modern economical influences, fully at liberty to assume like all others, its most efficient form and organization; and the consequence was the most astounding industrial development the world has ever witnessed.

Many have attributed the rapid progress of this new industry to the fostering effect of bounties, but although this was undeniably a stimulating cause, it was very far from being the fundamental one, and would alone have accomplished little or nothing of permanent value. There was no intentional bounty, nor was it given to the producer. He conquered it through his intelligence and enterprise by getting a much larger yield from his raw material, than the government thought possible. The tax was simply converted by the manufacturer himself, into a merited reward for improvement. The planter, protected against all competition by climatic monopoly of the tropics in sugar making, would have found a much larger bounty in the prices maintained for his products, if instead of converting his large margin into a premium upon apathy and retrogression he had imitated his rivals. What better evidence of this than the fact, that although cane sugar has since been made in central factories at a cost of less than two cents a pound, the planter complained when the price fell from six to four cents, that there was no longer any money in the business, and many were ruined by the fall. The rapid strides made by the beet industry, were simply due to the enormous room left for improvement by the effete plantation system. The German producer had only to establish his manufacture upon well known economical principles, whose adequacy was proven in every other industry—summon to his aid that science which the planter had always pertinaciously and systematically rejected, and walk over the open, unobstructed course.

We may assume, then, that the evolutions of the new industry were the result of purely normal influences, and that the bounty it captured merely accelerated without varying or perturbing a sequence of development based upon the highest economic and scientific principles, and not in imitations of other manufactures, but compelled by the same natural conditions which produced and governed them all.

Mr. Clement very truly says that "you cannot buy cane by the ton and manufacture sugar, just as you buy logs, wool and wheat," but this instead of being an argument against, is in fact, the fundamental difference which brought the central factory system into existence. Upon the separation of the two branches of production which the primitive slave industry had joined, the peculiar nature of the raw material was the one exceptional circumstance which obliged the single deviation made from universally established industrial practice.

The plantation owed its origin to the existence of slavery, the central factory to the perishable nature of the raw material.

This is amply confirmed by what has taken place in the Island of Cuba. Twenty years ago the more advanced planters commenced giving their lands out to tenant farmers and buying cane from their neighbours, as the only remedy for the liberation of their slaves, which they knew must come sooner or later. On the first plantation where the system was put to the test, several of the heirs of the property took lands to raise cane, in order to set the example, and others of the family took charge of the manufacture. The crop increased under the new arrangement, from 6,000 to 17,000 boxes of sugar, leaving over $140,000 clear profit yearly. Before the negroes were finally freed, nearly all the plantations had been merged into central factories, and the owners finally asked for the extinction of slavery as an encumbrance, before the allotted time. Many new factories were built from the outset upon the central plan, while slavery was still in existence, and there were cases of planters freeing all their slaves at once, to end the plantation system of combining both branches of production.

When the great sugar crisis came, all who were not buying cane or prepared to do so, were "improved at once off the face of the earth." Thus the plantation fell before the central factory at the first blow in most tropical countries, and if it still survives in Louisiana and Demerara, its existence has been prolonged in the former by a high protective tariff, and in the latter because serfdom, which gave it birth, is still maintained there in a modified form by the importation of bound labour.

Santiago Dod,

New Orleans, La.

DIFFUSION:

PRACTICALLY CONSIDERED.

By Santiago Dod.

Although Louisiana may justly claim the credit of being one of the first cane-producing countries to attempt the application of a process which has revolutionised the manufacture of sugar in Europe, inadequate technical knowledge with regard to the real scope and nature of this improvement has given room for a great deal of misconception as to what is required for further elucidation in the new system of extraction, and as to what has really been determined by the recent experimental operations.

To leave these erroneous conceptions uncorrected, would not only deprive what has been effected of most of its practical utility, and tend to defer the introduction of the improvement where it might be truly advantageous, but would also expose those who should adopt it to serious disappointment and loss.

The task of elucidating these questions is, in some respects, a delicate one, as in order to arrive at any definite conclusions with regard to the results, reference must be made to the errors which may have been committed during a long series of investigations; but the work has been undertaken in no spirit of gratuitous criticism or censure, but solely in compliance with the request of persons directly interested, and in the hope of being of some slight service to the principal industry of the State. Less compunction may be felt in dealing freely with this subject, from the fact that these errors were wholly due to the original mistake of burdening the Agricultural Department with labours outside of its province, and entirely foreign to its true sphere of action. The problem to be solved was not a chemical, and much less an agricultural one. The chemistry of diffusion was already sufficiently known, and no chemical ability was required for these investigations superior to that which every well-conducted sugar house calls for. The whole task was simply and purely a mechanical and an industrial one, and what it actually demanded was a competent and experienced mechanical engineer (not a mechanic), and a sugar expert well versed in the new process. From the very nature of the institution there was no one in the department pertaining to either of these professions, and neither the one or the other could possibly be improvised. More was known about diffusion in Louisiana, where several attempts to introduce the process had already been made, than in Washington, where no data nor antecedents of any practical value existed, or knowledge even of former trials. Those upon whom these onerous duties were imposed were, therefore, obliged to serve a long apprenticeship to these professions, going over the beaten track to reach finally a point arrived at by sugar experts long ago.

It seems evident that the funds dedicated to these investigations should have been confided to the Planters' Association, which, availing itself of the costly experience of former trials could have made the experiments a success from the beginning. The tardy results obtained are a new evidence of the fact that private investigations are more efficacious for such purposes than the hampered action of a governmental department, and also prove that the Louisiana planters would have shown more wisdom, public spirit, and enterprise, had they imitated those of Java, by raising the funds, and doing their own work in their own way. "Providence helps those who help themselves."

The recent experiments have undoubtedly been of real service to the industry in so far as they have reconfirmed results obtained elsewhere, and brought practically home to the few planters who took the trouble to visit the station, the extreme feasibility of the new process; but beyond this they have done less than was hoped to further or perfect the application of the system, to the manufacture of cane sugar.

Contrary to what seems to be the general opinion, no experiments were needed to prove that about all the saccharine matter contained in the cane *could* be extracted, nor to demonstrate the fact that there was no difficulty in the clarification of diffusion juice, and obtaining from it products as good if not better than from mill juice. These two points had been virtually settled in favour of the diffusion battery eighteen or twenty years ago in India, at the Aska Works, where the process has proved a success in the regular routine of industrial practice during this long period of time. The practical details which were still in doubt and required a definite solution were:—(1) The best andmost economical cutter for reducing the cane to chips. (2) The best form of diffusion battery. (3) The extreme possible minimum in the dilution of the juice. (4) The value of the exhausted chips a fuel, and the most economical way of utilizing them as such.

These latter points were the most important of all, for, as will be shown further on, without consuming the residue of the cane diffusion under the present conditions of manufacture will be simply impossible.

What has been advanced will suffice to show that to derive any additional knowledge from the experiments in the practical adaptation of the process to the extraction of cane sugar, we must do so rather by a series of deductions from what was done there and elsewhere, than from any definite result obtained at Lawrence, where, with all the experience necessary to solve the whole problem, the funds disposable would have been insufficient for the undertaking. Before entering upon this phase of the question, reference should be made to

Two other Misconceptions

generally entertained.

Great stress has been laid upon two points—the amount of sugar obtained and of fuel consumed. What was or was not accomplished in these particulars has only a relative importance, and little or nothing to do with the success or non-success of diffusion in itself. In a well-constructed battery, practically *all* the saccharine matter can be obtained, provided circumstances permit the use of a sufficient quantity of water. The efficiency of a battery like that of a cane mill, is not determined by the amount it extracts, as this depends upon circumstances entirely distinct, but by the amount of sugar left in the residue. As the diffusors do not *produce* sugar, and are merely intended to extract from the chips about all the saccharine matter they may contain, the large percentage reached at the Magnolia trials was rather an evidence of the superior quality of the cane diffused than a proof of the merits of the system in itself; and if the chips had contained 300 lbs. they would have yielded this amount just as readily as the 230 lbs. actually obtained.

With respect to the cost of production by diffusion, the experiments unfortunately proved little or nothing, and in any case what might have been done there, would have furnished no criterion as to what could and should be accomplished with the process. The system simply demands the aggregation of more or less water over and above that already contained in the juice, and the increased expense which this implies depends (apart from the proper construction and working of the battery) upon the kind of fuel and perfection with which it is consumed—the efficiency of the means employed in the generation of steam and the concentration of the juice, and the extent to which the exhaustion of the chips is carried, the latter being perhaps the most important question of all, and one which brings us to the consideration of another serious error into which all have fallen, who have attempted the application of diffusion to the extraction of cane sugar, and also one which has probably done more to retard its general introduction, than any other circumstance connected with its long probation.

Simply because this more scientific method places at the command of the producer the means of virtually attaining a total extraction, it has been too readily assumed that he is therefore *obliged* to push the advantage to its extreme limit, without any regard to the economy of results beyond obtaining all the sugar from his cane. However correct this may be in theory, no very profound reasoning is required to prove that under general conditions, the principle is practically and economically false, and that certain limitations are imposed by local circumstances entirely beyond the manufacturers' control. If the chips are burnt for the production of steam, avoiding thus the expense of substituting some other fuel for the bagasse (upon which the whole manufacture depends in all cane producing countries except the United States), the only remaining obstacle to the immediate adoption of diffusion upon plantations which have improved apparatus, lies in the extra cost of evaporating the added water. It follows then, as the effect of this important factor diminishes rapidly as it nears the end of the operation, and the dilution increases at the same ratio the further the extraction is carried; that the enormous excess which has always been the bane of the whole system, is due to an unwarranted persistence in obtaining all the sugar, disregarding the fact that the amount of added water finally becomes so great that the last remnant of sugar must inevitably, under the ordinary conditions of the industry, cost more than it is actually worth.

What has undoubtedly led to this misconception, was an inconsiderate acceptance of the rule in European practice, without taking into account the vast difference of local circumstances. In Germany for instance, besides the advantage of comparatively cheap fuel and dear sugar, which permits a sacrifice of the former in favour of the latter, the tax is collected in such a manner that a large bounty is obtained upon all the saccharine matter, over and above a given amount, so that the last remnant of sugar in the chips is precisely the portion of the whole yield which gives the largest profit.

In cane producing countries these conditions are entirely reversed. Not only is coal comparatively dear, but from the great excess of water requisite to complete the extraction, the small remaining fraction which, in Europe, gives the highest profit, is precisely that which is most heavily handicapped by the great amount of fuel its utilization demands. The extent then to which the exhaustion of the chips may be carried, is not optional with the producer, but depends upon the comparative value of coal and sugar, and the state of the market. This gives the planters in the United States a decided advantage in the adoption of diffusion over their competitors in tropical countries.

The positive practical advantage then, of the new process over the old method, is that of having at command the means of varying the limit of extraction at will, graduating it to what the highest economical results exact, whilst with the mill, the limit is virtually fixed. In the majority of cases throughout the tropics, the producer will, under ordinary circumstances, probably be obliged, by the high price of fuel, to sacrifice at least 5% of sugar, and in very few, if any cane producing country, will the loss be brought lower than 2%; but where we consider that very few of the best mills exceed an extraction of 70%, which is equivalent to a sacrifice of 20% of masse-cuite; even the highest figure named will seem a comparatively small loss, as it will leave a clear gain in most cases of 15%.

Having dissipated at least a part of the mist which enveloped some of the most important phases of the question, we will now endeavour, through a series of practical deductions from what has been effected here and elsewhere, to determine what are the essential requisites for an economical adoption of diffusion to the extraction of cane sugar —beginning with the examination in detail of the operation of

Reducing the Stalks of Chips.

To effect this upon a small scale is so simple that nothing is needed but a carpenter's plane, secured bottom up in a bench vice. By pressing a stalk of cane against the face, at an angle of 40°, moving it rapidly back and forth, we imitate exactly what is done by a cane-slicer, with the difference that a number of knives secured to a disc of iron revolving from 150 to 200 turns a minute are used instead of a single one placed in a stationary block of wood. The thickness of the chips is graduated as a carpenter regulates that of his shavings, by projecting the cutting edge more or less from the face of the tool.

Cane-slicers are divided by the position of the discs into two classes —vertical and horizontal.

The advantage claimed for the latter type, is that of having a number of hoppers through which the cane is fed, whereas the vertical cutters made up to the present time have only one. With the horizontal disc each knife, therefore, makes during every revolution as many cuts as there are hoppers, to only a single cut by each knife of the vertical type. At Lawrence, there were two horizontal slicers, but only one was used, and was, in at least one particular, inferior to that which was not erected. Both were provided with six hoppers, but in the untried machine these were duplex, or, more strictly speaking, there were but three, divided across the middle by an iron partition. This improvement gave a space of double width for the introduction of the stalks, whilst in the other cutter the hoppers were evenly distributed around the circle separately, each by itself presenting a mouth so narrow that but a handful of canes could be presented at a time.

The multiplication of cuts is the only real advantage which can be claimed for this class of machines, but it is insufficient in itself to compensate the many defects of the system.

The vertical disc can be fed automatically by a cane carrier, similar to those used on the mill, whereas the horizontal plan necessitates supplying the cane by hand, carrying it a considerable distance. Although this may not appear so serious a defect in Louisiana, where the antiquated system of spreading the cane about the mill-house is still maintained, employing a large number of hands to transport it to the carrier; but so lavish a custom could not be tolerated where the manufacturer is obliged, by the low price of sugar, to study the economy of labour, and even here it must sooner or later be abandoned.

This disadvantage alone should suffice to condemn the horizontal disc, but this is far from being its only defect. The knives press the cane against the *upper* side of the hopper, and not against the lower side or bottom, as in the vertical system; consequently, as the stalks only come in contact with the knives by their own gravity, they must be left loose and free in the entrance, which, besides greatly limiting the number which may be introduced simultaneously, gives rise to another very serious evil. As soon as the canes are reduced enough in length, they fall crosswise, and present their sides instead of their points to the cutting edges, and are not sliced regularly into chips, but are torn to splinters, or reduced to long longitudinal strips. This occasions two very serious losses in the ulterior operations.

To diffuse rapidly the ends of the minute cells, which contain the juice, must be exposed to the action of the water, and, to attain this, the stalks must be cut crosswise, consequently these longitudinal chips retain a large proportion of their sugar after the rest of the charge is exhausted. Besides diminishing the charge, they prevent the cane in the diffuser from forming as compact a mass as it should, decreasing the displacement, and increasing that great bane of the process, the dilution of the juice, by leaving an excessive space in the vessel, to be filled by water.

The horizontal disc cutter is also more costly in its erection, as it must necessarily be under driven, and this demands an expensive excavation, mason work, countershafts, and belts; whereas the vertical cutter may be driven directly from the steam cylinder, the disc serving as a fly-wheel to the motor. Furthermore, the hopper, or rather chute (for it changes its character upon the vertical disc-cutter), is open at the top, and much more cane can be fed through a given space in it, than through that of the other type. The disadvantage of making but one cut to each revolution of the disc can be further compensated by increasing the speed and number of the knives, and, although it is true that the augumentation of the latter factor would entail the sharpening of more knives, this would not in reality increase the labour in this respect, for as they are dulled more or less quickly according to the amount of work done, if twice as numerous, they would last twice as long. There is no apparent impediment either to increasing the diameter of the discs, making the knives twice as long and in two sections.

Mr. R. Seig has devised a plan which seems feasible, by which the cane will be presented to the disc in three places and fed by a carrier, which, if successful, would remove the sole objection to this type of cutter, as about twice as much cane can be fed through the chute as the hopper will take without stalling, and this would about equalise the efficiency of the two systems in amount of work.

The report of the Department shows that at Fort Scott the vertical cutters worked well upon cane, and if not upon sorghum it was evidently due to the pithiness which characterises the stalks of this plant.

As to the question of the labour and delay involved in removing and replacing the dull knives, it was completely set at rest by practical experience at the "Magnolia," inasmuch as this operation was there effected in about six minutes. The knives, instead of being bolted to the plate, are secured to movable frames which are placed in corresponding cavities in the disc, and advanced towards the perimeter, where they are retained in place by dovetails, and the centrifugal force exerted by rotation.

With the object of avoiding the adhesion of the cut surfaces of the chips one to another, thereby excluding the water from contact with the cells and retarding their diffusion, a grooved or indented instead of a straight cutting edge was adopted for the knives, so as to make corrugated surfaces; but this, judging from the condition of the chips delivered at the diffusors, seems to be unncessary, and even disadvantageous. Such a proportion of the slices were so much reduced and subdivided (apparently by fracture) that even in the impossible case of the few which remained whole, falling together in any one locality of the charge in the vessels, the loss from this cause would not apparently compensate that incurred by the increased space by the corrugated chips, and consequent augmentation of added water. In any case, if this change is adopted, it would seem to require a great reduction in the size of the grooves.

The necessity of making the chips as thin as possible, in order to increase both rapidity and perfection of the results, is sufficiently evident, as is also the fact that the amount cut in a given time will decrease as the thickness is diminished. One the principal difficulties Dr. Wiley seems to have to contend with, was the inability of the cutter used to supply thin chips in sufficient quantity to work the battery to its maximum capacity. Whether or no the angle at which the knives were placed in the disc had any influence upon the deficiency was not apparent, but if it has not already been determined elsewhere, the best angle for the knives, as well as that for the cutting edge, should be ascertained by careful trial, as it may have a great influence upon the quantity of thin chips which can be cut in a given time.

Enough has been adduced to show that the problem of the diffusion of cane may, as far as the operation of slicing the stalks is concerned, be considered as very approximately solved for all practical intents.

Next in order come the questions of the size, construction, and working of

The Battery.

In regard to some essential points that were, and are still, in doubt, a considerable amount of highly useful information may be derived from a close study of the practical results obtained at Lawrence; but, as generally happens in operations of this sort, rather from the revelation of defects to be avoided, than from anything fully determined which had not already been demonstrated elsewhere, experience of this negative kind, however, often has a value little inferior to a positive elucidation of the question at issue, as knowing more or less thoroughly what should *not* be, so narrows the circle of investigation, as to point very clearly to what *should* be done.

One of the first points to be determined in the construction of a battery, is the size, and it is one of those in respect to which there does not seem to have been sufficient experience for a definite settlement, and there is still apparently a great diversity of conclusions upon the subject, even among manufacturers themselves, some favouring small diffusors, increasing the number in order to compensate the diminution of their content. In this particular, as well as in that of excessive extraction, or, rather, its natural consequence, excessive dilution, it seems probable that European practice (so distinct in some matters to that which must ultimately prevail in cane-sugar extraction) is exercising a retarding influence, as small vessels have apparently very grave defects. It is evident, in the first place, that the labour of manipulating a battery, that is to say, the shutting and opening of tops, bottoms, and valves, to a given amount of cane, increases in the same ratio as the cubic content is diminished.

Furthermore, the diffusors must be filled so rapidly in charging with chips, that insufficient time is given for making the charge as compact as the best results demand, for besides diminishing the capacity of the battery, it aggravates the worst feature of the process augmenting the dilution, by reducing the displacement, and increasing the liquid content of the diffusor, to avoid which every possible means should be employed. This difficulty does not occur in Europe, owing to the slippery and pliable nature of the beet slices.

What seems, however, to be the main defect of a large battery of small diffusors, is the necessity of working it so quickly that a rapid current is established, and the water, instead of percolating slowly and evenly through the whole mass of the charge, makes its way, more or less directly, from the induction to the discharge pipe, and effecting less and less the chips in proportion to their distance from the centre of its course, compelling the use of a much larger proportionate quantity of water to a given extraction, or depletion of the chips, augmenting again from this source the great defect of the process. The fear that any serious invertion of sugar or accidulation of the juice would result from a retardation of the process or operation, seems to be groundless, as far as can be judged by general experience up to the present. During the trials of diffusion at *Nonpareil*, from an insufficient supply of chips caused by defects of the cutter, juice was detained hours in the battery without suffering any very serious deterioration.

It may safely be concluded, then, that the tendency should be toward larger vessels. It may be advisable to increase both size and number, for, as will be readily understood, by drawing charges of juice smaller than the liquid content of a single diffusor, the juice will be more dense from part of each charge being longer in contact with fresh chips, and although this will have the same effect at the other end of the battery, making denser the last charge upon the exhausted chips about to be removed, and leaving them, when discharged, slightly richer in sugar; but this can hardly be advanced as an argument against the practice, when it seems so clearly evident that until the machinery for contentrating juice becomes so perfected, that the fuel furnished by the cane itself be adequate to the whole work of manufacture, the diminution of the added water is the *sine qua non* of the application of the system to cane sugar extraction.

The diffusors used in the Magnolia experiments had a capacity of 65 cubic feet each, and were calculated to hold 2,000 pounds of chips, a quantity which was never reached, owing probably to the defects already indicated. Calculating six minutes to each cell, a celerity at times attained with properly cut cane, it would have been adequate to the working of 240 or 250 tons of chips daily, but with the excessive dilution which was the defect of all the trials made. With the addition of two more diffusors, it might accomplish this amount of work under better conditions, but would probably not reach a very high standard of extraction.

THE SHAPE OF THE CELLS

of the battery, whether they should be high or long, and of comparatively small diameter, or the reverse, is another of the open questions, but if we accept the experience of the Austrian manufacturers in their efforts to evade the Government tax, the tendency should be towards large shallow vessels. This, however, appears to need further investigation in its application to cane.

One of the first difficulties experienced in the application of diffusion to cane, was that of discharging the cells, owing to the fact that the chips, within a circle of certain limits, form a compact arch, or, rather, dome, and will not drop. As there was no difficulty in this respect at the "Magnolia," it may be presumed until the contrary be proven that the size of the bottoms of the diffusors employed there (39 inches) may be taken as the maximum needed to avoid this difficulty, and that whatever the size adopted for the body of the cell, the bottom door need not exceed the diameter named.

It seems probable that it would be advisable to make the covers large enough to admit a man without interrupting the operation of filling the diffusor, to spread and compress the chips with his feet as they fall, for without this or some automatic means to this end, it seems impossible to attain the adequate compactness of the charge which is so important to the attainment of economical results.

There was one evident defect in the construction of diffusors employed in the recent experiments which should not pass unnoticed—that of the vertical perforated plate circling the lower border. In expelling the water by compressed air as soon as this reached these openings it escaped, leaving a considerable quantity of liquid in the cell to be lost upon the discharge of the chips. It is to be presumed that the injury was not limited to this needless sacrifice, and that the juice in passing from the diffusors took more or less the same course as the air, leaving the charge at the bottom imperfectly diffused. The circular horizontal perforated plate which covers the bottom appears to be amply sufficient for the object sought, and the additional plate is undoubtedly a needless expense and injurious.

The question of the most convenient form of battery or relative position of the cells which compose it, appears to have been pretty conclusively determined in favour of the line or double line arrangement. The system adopted for charging the circular battery by means of a central funnel and gyrating through, is undoubtedly commodious, although defective in one respect, as it requires a very high roof, or to project above it; but its paramount objection arises from the difficulty attending the removal of the discharged chips. An attempt was made to effect this with cars upon a circular track, but, as happened also in Demerara, the curve was too rapid to permit their use. This obstacle would, however, disappear in a very large battery, through the enlargement of the circle, or could be obviated by using eight wheels under the cars, in place of four. Still, the general tendency is at present toward straight double line batteries effecting the filling of the cells above, and the removal of the chips below, by means of carriers.

The foregoing deductions seem to show that as far as the question of adequate construction goes, the points still awaiting a more definite solution are minor ones, and that experience enough has been accumulated in respect to the main requisites to enable a competent engineer to design a battery, which, if still open to further improvement, will have no defect serious enough to jeopardise results in this particular.

Unfortunately, matters are not quite so clear in relation to two very important phases of the application of diffusion with respect to the succeeding operations in the concentration of the juice obtained. As is well known, the two weak points of the new system are the excessive evaporation the process entails, and the aggravation of this serious defect by the total or partial sacrifice of the fuel, which, in the form of bagasse, is sufficient in other cane producing countries for all the real exigencies of the manufacturer, and would also be in Louisiana, if the most perfect known appliances were employed. The whole economy of the process, and the possibility of its adoption in the production of cane sugar hangs upon these two factors, or in other words, upon the minimum cost of the concentration of the juice by the most adequate combination of all known means at our disposal. The first to settle then as a basis is the absolute

Minimum of Dilution

requisite to the virtual extraction of all the sugar in the chips. Owing to one defect or another, this has not been determined anywhere as yet, and at the "Magnolia" the defectiveness of the cutter would alone have precluded all hope of doing so. This point definitely settled, there is still another intimately related which also requires practical demonstration, although no attention has apparently as yet been paid to it by any investigator. As has already been shown, the rapid increase of dilution requisite for extraction, as the quantity of sugar retained in the chips diminishes, fixes some point near the end of the process at which its continuance under the prevailing conditions of the industry will not only cease to be remunerative, but will burden the product already obtained, with an additional cost. The practical demonstration then of the percentages of sugar which would be sacrificed at different stages of dilution, is necessary to enable the producer to calculate the cost and know whether in the special conditions of his manufacture the gain in sugar would compensate the cost of fuel. This point will be again referred to further on, and we will now enter upon the most important phase of the whole complex question of the adoption of diffusion, and one upon whose adequate solution the whole financial problem depends—the

Disposal of the Depleted Chips.

Theoretically these should undoubtedly be returned as manure to the soil whence they came, although no exaggerated significance has been given to this disposal of them. The better portion of the elements of plant food developed in the cane are concentrated in the top and trash which are by the prevailing custom in Louisiana inconsiderately burnt upon the field, although already distributed upon the land, and the utilisation of them in their organic form would therefore demand no invertion of labour for transportation. With regard to the burning of the chips, the fact should be borne in mind that the elements are not entirely lost thereby, as the ashes still remain, and although a considerable portion of this mineral residue is rendered insoluble by the intense heat needed for the combustion of moist materials, even the injured part is useful in its mechanical effect, and the loss in manurial value is in a measure compensated pecuniarily by the great saving of labour in the application of what remains in so concentrated a form. It is true that the organic element is entirely destroyed by combustion, but this becomes a matter of little weight when its equivalent can be reproduced so economically upon the land by substitution (avoiding the expense of transportation which in all bulky manures is the most costly item attending their use), through the simple use of that inestimable boon, the cow pea. If we add to all this the insurmountable objection that the chips contain, 90% of water, which is supplied gratis by Nature, to the fields, without human intervention, the anti-economical results implied by the transportation of 90 tons of useless material to obtain 10 tons in useful effect, becomes too evident to require further comment.

The use of chips as manure might be economically effected upon the limited area of a small plantation in Louisiana, where the largest are too reduced to offer any fair chance for remunerative results in any other country which lays claim to being a sugar producer, but it is to be supposed that the more intelligent of Louisiana planters no longer dream of persisting in the vain and suicidal attempt to compete with large central factories abroad by what a foreign sugar expert has not inaptly termed *vinegar factories* at home.

If they do blindly continue to ignore the value of the industrial experience of every other country which pretends to manufacture sugar, the natural course of events will not much longer permit so ruinous an error, and small planters will eventually, with few exceptions, be forced here as they have been the world over to abandon manufacture and sell their cane to those who, by superior enterprise, intelligence, or means, are prepared to pay for it more than they can possibly obtain by working it themselves; or they must be crowded out of the industry altogether, to give place to men of more modern ideas. With the ominous shadow of coming events already clouding the near future of their whole industry as it at present exists, it is worse than useless to continue laying plans and devising methods of procedure based upon a false system whose inevitable doom was sealed years ago. To pretend maintaining sugar production upon the present effete organisation which has been discarded as ruinous by all the world, can add little to the prosperity of the State or their own financial security. The term small plantations is of course meant to include all under an output of three or four million pounds. The fact that the crop of a plantation in Louisiana has to be summed up in *pounds* to make it appear respectable even to the producer, while everywhere else it is given in tons, and long ones at that, is sufficient in itself to show the weak points of the whole system.

All new plans of operation for the future must conform to the requirements of concentrated manufacture upon a large scale, and the raw material must be transported over a radius of thirty or forty miles, for which ample facilities exist in many localities, either by land or water. It is evident then that the distribution of the rejected chips with their 90% of useless matter, over so vast a tributary area will be economically impossible, and were the residue allowed to accumulate about factories of such magnitude, they would have to suspend their operations before the end of the first campaign, by being buried under their own refuse.

(To be continued.)

DIFFUSION IN THE HAWAIIAN ISLANDS.

From the *Hawaiian Gazette.*

Within the past few months Colonel Z. S. Spalding, manager of the Makee Sugar Company, has imported from Germany and erected at Kealia, Kauai, a costly plant for extracting the juice from the sugar cane by the diffusion process, such as is used in the manufacture of beet sugar in Europe. When obtained, the juice is converted into the different grades of raw sugar by the same appliances as are used for juice expressed by roller mills.

A representative of the *Gazette*, Mr. Dan Logan, had the pleasure of seeing the diffusion process in operation, May 16., and his description being very minute and clear, will be read with interest by all engaged in the manufacture of sugar. The machinery is housed in a building of corrugated iron erected for the purpose, equal to three stories in height, but floored in only two, the space of the third being required for lofty hung gear. For the purpose of description the plant may be divided into three parts, namely: Cutting, Carrying and Diffusing. The cane is flumed on to feeding travellers the same as for a roller mill, but it requires probably more handling to feed to the cutters than to the rollers.

There are three cutting machines, which receive the cane, through six sloping funnels, with a capacity of ten or fifteen sticks of cane at a time, fed endwise to the knives. Four knives are fastened to arms attached to a swiftly revolving and upright spindle. They therefore cut laterally, but the cane being fed obliquely is sliced into thin chips, diagonally across the grain.

The chips fall from the cutters into receivers on the lower floor, whence an endless system of toothed carriers convey them almost to the summit of the building, there emptying them into a long funnel, the delivery end of which can be swung over the upper mouth of any of the twelve diffusion tanks requiring to be filled. While talking of carrying appliances, mention may be made of another system that carries the chips, when their saccharine matter is exhausted, from the tanks to the old maceration mill. The chips are passed through the latter machine to squeeze all the water out of them, and thus render them fit for fuel.

There are twelve diffusion tanks, with an estimated capacity of about 500 gallons each, the exact quantity not having been ascertained as yet. More tanks may be added to the system if necessary. The twelve are ranged in about a three-quarter arc of a circle, with room for four other tanks between the ends of the row. Iron pillars and iron and wooden joists support the tanks. The dome-shaped top covers of the tanks and apparatus for opening and closing the covers, and appliances for controlling, regulating and drawing off the liquid contents, etc., are all just above the second floor, while the main portion of the tanks show beneath, their bottoms being five or six feet above the ground floor. Close-fitting bottoms on hinges sustain the contents of the tanks or release them when desired, being held hard in closed position by counterpoises of 800 or 900 pounds at the ends of levers about five feet in length. Between the tanks are heaters through which the liquid currents pass from one tank to the next.

Having seen the plant, the next thing is its operation, or the diffusion process. The tanks are filled one by one with cane chips from the cutters. Diffusion is to proceed in ten out of the twelve tanks simultaneously, but in graduated stages of completion. Of the remaining two tanks, one is receiving chips from the cutters, the other being emptied of exhausted chips to take its turn next in order for filling. There is therefore a circuit for the process of diffusion constantly throughout the ten tanks. Water of a temperature of 195 to 200 degrees—it must be below the boiling point—is admitted at the base of the freshly filled tank. The hot water is forced upward through the mass of chips, and, leaving at the top of the first, descends through a heater to the bottom of the next tank, and so on through the whole battery. It should be stated here, however, that the juice may be forced through the system by either water or compressed air, there being an air compressor set up ready for producing the latter power when desired. The circulation goes on through the series of diffusers until the water from the one started with stands at zero, or becomes destitute of a trace of saccharine matter or sugar. Then that one is switched off the circuit, the one filling in the meantime is switched on, the first one taking its place at the filler, and so the process goes on without interruption. It will, of course, be understood, being impossible to explain minutely without diagrams, that there are ducts for the circulation of the juice, hot water or compressed air, with apparatus for drawing off test samples of juice, releasing vapours, ascertaining temperature and conducting liquids of all kinds wherever wanted. From the diffusors the juice goes to the clarifiers as from the rollers in the grinding process, and it is not the purpose of this description to follow it there.

A few words on results expected and thus far achieved, will perhaps enable planters, as well as others taking an interest in the matter, to gather from the present account a correct idea of the status of Colonel Spalding's enterprising and very important experimentation with the diffusion process. The object of introducing the new plant, as that of the many improvements in sugar making adopted on these islands within recent years, is, of course, to enhance economy of production—in this case, by getting the greatest possible amount of sugar out of the cane. A problem ever to be kept in view in making improvements is whether the gain in production is not wiped out by the increase of expenses. Keeping these points in view, the limited range of known results in diffusion as shown at Kealia, may be examined.

The guaranteed capacity of this diffusion plant is 400 long tons of cane per day. As it has only been operated a few days since setting up, nothing may be said as to results in that regard. As to thoroughness of extraction, more definiteness of information can be employed. The process is guaranteed by the manufacturers of the plant to leave not more than four-fifths of one per cent. of sugar in the exhausted chips. This result attained, with other things equal, there would be a gain over the process of double crushing and maceration, as very efficiently done by the Kealia mill, of from twelve to eighteen per cent. of sugar. It is estimated that there is seventeen per cent. of sugar in the cane. Tests of the exhausted bagasse, or trash, after passing through the hot water maceration mill, reveal five per cent. of sugar, or at least twenty-five per cent. of the quantity originally in the cane. Now the result of diffusion on the first day's trial was a residue of three per cent. of sugar in the waste material reduced to two per cent. the second day, one per cent. on the third day, and less than one-half per cent. on the last day in operation. This is certainly coming as close to the guarantee as might reasonably be expected from so limited experimentation with apparatus entirely strange to the operatives.

Under the question of fuel, which has been a burning one even with the Louisiana planters in considering diffusion, two points at least remain to be positively settled at Kealia. One of these refers to the density of the juice, in which results so far are scarcely to be taken as ultimate. Juice from crushing, stands all the way from five to eleven degrees Beaume, as compared with distilled water or zero. The juice from the diffusion process at Kealia has registered as high as seven, eight and nine and a half degrees. If the density of diffusion juice cannot be made to reach the standard of that from crushing, the natural inference is that more fuel will be required to evaporate the excess of moisture. The other point is whether the exhausted chips from diffusion are within a measurable degree of being as fit for fuel as the trash from maceration. In both cases the refuse is treated with petroleum applied through a perforated pipe on leaving the maceration mill. Colonel Spalding is of opinion that the diffusion trash will burn satisfactorily, but the test has probably not proceeded far enough for a definite comparison in results with those of the ground cane.

A very satisfactory result from diffusion seems to have been already proved in the superior purity of the juice. Analyses have shown that there is actually a less proportion of acid in the juice than the normal proportion held in the cane itself. Also it has been ascertained that the gummy property of the cane, which after crushing went with the juice, is in the diffusion process carried away in the waste water. This is really a facilitation of the passage of juice from the filter-presses, instead of an impediment as some practical men had predicted.

Colonel Spalding says that the difficulties most apprehended have not been encountered, while trouble has been met in unexpected places. On Wednesday, May 16th, the counter-weight to the bottom of one of the tanks proved too heavy for the lever fastening at the inner end, and tearing the wrought iron asunder at the bolt-hole came crashing to the ground. This tank had to be dispensed with until repairs could be effected, but the process was carried on in the remaining diffusors until the forenoon of the next day, when another lever gave way. The other bars also threatening to break down, it was decided to have all of them reinforced before resuming operation. Accordingly the diffusion was suspended for repairs, the crushing mills being reverted to in the meantime. It is strange that European mechanics, above all, should so mis-calculate a mechanical principle as appears to have been done in this case. The levers are of angle iron, but the bolt-hole through the lower piece, at the point of the severest strain, left a fatal weakness. This was purely a mechanical fault, however, not affecting in the slightest degree the principle of diffusion.

What is undoubtedly a more serious, but still only a mechanical difficulty, has developed itself in the cutting machine. Fibre and other fine material from the cane rind accumulate in the periphery of the cylindrical box where the knives revolve, and jam between the knife-bars, the narrow slide on which their outer ends rest, and the walls of the box. This soon clogs the machine so as to necessitate stopping it to be cleared. Although two machines might keep up the supply while one is being cleared, yet the latter operation is annoying, difficult, and time-wasting, besides it may be delayed a moment too long with disastrous results. During the present suspension on account of the other breakage above referred to, a structural change was to be made in the knife-bars, which it was hoped might overcome the difficulty just described.

In previous portions of this narrative, the different processes of obtaining the juice from the cane—by maceration and diffusion—have been described. It should have been stated that the power for the milling operations is furnished by two engines, respectively of 80 and 100 horse power. There are special engines for running the centrifugal machines, pumping apparatus, etc., and a very ingenious, automatic steam pump for feeding the boilers, which is self-regulating and a great saver of both care and labour. An outline of the process of transforming the raw juice into sugar may now be attempted.

From a receiving tank the juice is pumped into the clarifiers, of which there are eight, with a capacity of 150 gallons each. Heat is applied by steam pipes until boiling is produced, when lime is thrown into the liquid, bringing a foaming mass of impurities to the surface. This scum is swept off into receivers, as the liquor is boiled to a certain density, ascertained by tests, after which the contents are drawn off at the bottom of the clarifiers and conducted to the cleaning pans. There are five of these pans in the Kealia mill, and in them the liquor is further heated and skimmed. Then it is led into two mixers, respectively of twenty and sixteen tons capacity. The mass is now very much thickened in consistency, and is pumped into the double effects, there being two of these great utensils, where it is boiled in a vacuum—the hot vapour from one caldron of the double effect sufficing to boil the mass in the other. The juice has now become molasses, and that is pumped into the vacuum pans, there being also two of these apparatus—one a monster of sixteen tons capacity, made by Dealey, of New York, the other holding eight tons, made by the Honolulu iron works. Here the molasses is evaporated into sugar in a vacuum produced by the condensation of its escaping vapour, but it is such sugar as none of our readers would have his cup sweetened with—a vile-looking black mud. The boiling in vacuum, as no doubt is generally known, is designed to effect the process in a lower degree of heat than is necessary to boil a liquid in the open air, and the especial object is to prevent the formation of what is called invert sugar—a substance inferior in solubility, sweetness and wholesomeness to the true article, and one which interferes with the graining or crystalization of the product. A fully cooked batch in the vacuum pan is called a "strike," and it is dropped through the bottom into troughs, whence it is drawn off as desired into the centrifugals. There are twelve of these machines, their operation being one of the most interesting sights the mill affords to a visitor. They are circular shaped vessels mounted on upright spindles, with a close-woven web running all round a space inside the shell. The black saccharine product above mentioned, is dumped into the vessels, and the latter revolved with extreme velocity. In an incredibly short time—only a few seconds—the mixture is seen to grow light in colour until it attains a white-brown. It is comparatively dry, clear and crystalized sugar now, the liquid matter that coloured it having been driven by centrifugal force through the meshes of the web. Only four men are required to attend the twelve centrifugal machines, the same number that it takes to run three or four. A second grade of sugar is made by the reduction of washings of the different boiling apparatus and that of the liquor from the filter presses. There are three forty-inch frame filter presses in this mill, their use being to express the liquor from residuum gathered at bottoms of the clarifiers and pans. These presses have valves for releasing air bubbles in the tubes, which is held to be a great improvement on other kinds.

The more skilled employés of the mill—chemist, engineer, sugar boilers, carpenters, etc.—are Americans and Europeans, but Japanese are in great favour as sub-engineers and tenders of different apparatus. The Japanese are very teachable and faithful to their duties withal. One of them who came to the mill without any knowledge of English, about a year ago, has been taught to keep the record of the output of sugar, doing it with neatness and legibility.

Japanese women sew the mouths of the sugar-bags with a celerity that those of other nationalities never attained. Chinese, Japanese, and Portuguese divide the labour of the fields, and the company's pay roll numbers seven or eight hundred people. The daily product of the mill, running day and night, is about forty tons of sugar.

Instead of being housed in a single village, the labourers' cabins are scattered in small hamlets all over the estate—the habitations being usually clustered by nationalities—and this system has the advantage of having labourers near the different fields in sufficient numbers to work them. As a rule, house-plots are cultivated as vegetable gardens, giving a thrifty aspect to the scene.

ACTION AT LAW BY A PARIS REFINERY, FOR DAMAGES BY BEES.

One of the principal works of the "Raffinerie Parisienne" is situated at St. Ouen, near Paris. Bee-keepers, who do not belong to the commune, are accustomed to bring their stocks there at flowering time, so that the bees may get the honey out of the lucerne, clover, &c., which are cultivated to a large extent in the plain of Gennevilliers. But the bees, being intelligent little creatures, instead of roaming far over the fields and laboriously collecting the sweets from flower to flower, prefer to obtain the latter at the refinery close at hand, not only taking away a large quantity of sugar, but also severely punishing, with their stings, the workmen who are naked to their waists.

The Refining Company has now brought an action against three of the owners of hives near to their works, demanding the removal of the bees and payment for damages suffered. The defendants alleged that bees were wild animals, for whose actions they were not responsible, and that it was not proved that their bees had plundered the refinery. The tribunal has decided that bees which are brought to a place in June and taken away in September are not wild animals, and that their proprietors were, as a matter of principle, answerable for their acts, but as it had not been proved that the defendants were the actual proprietors of those which were complained of, the action must be dismissed. In Paris itself, the keeping of bees without an especial permit of the prefect of police was forbidden by an order of the 10th January, 1882.

THE COOLIE LABOUR QUESTION IN NATAL.

Mr. Daniel de Pass has addressed the following letter to the *Natal Mercury*, to show the injury which will be done to the sugar planters, if that portion of Mr. Yonge's bill, which proposes to abolish the grant in aid of Coolie immigration, is passed:—

Isipingo, April 30th.

Sir,—For the last nineteen years I have indented coolies from India, and I am concerned at finding there is an effort being made to curtail, if not to stop, the further introduction of coolie labourers. The Bill which Mr. Yonge has framed bearing on this subject, will no doubt necessitate a full discussion, and great stress will be placed on the fact that a very small proportion of the coolies who have served their time have taken to trade, and that therefore he injures the European. What alarms me most in this Bill is clause 3, to abolish the grant given by Government towards the introduction of coolies, which is set at £10,000 per annum. I have only recently arrived, and from pre-occupation I have been unable to acquaint myself with Mr. Yonge's general ideas on coolie immigration. It is not my purpose to enter into a controversial correspondence, but to express my opinions on the bearing of the questions to which the subject gives rise.

I was solely attracted to sugar planting from the fact that 19 years ago we could obtain as much kafir labour as we required at 6s. 6d., and the price of mealie meal, the sole food of the kafir, was 5s. 6d. per muid. This estate had some 300 as fine field labourers as one could desire to see. If Mr. Yonge will endeavour to restore this position, and give us an ample reliable supply of kafir labour, I will gladly lean towards his desire to greatly diminish the introduction of coolies. We cannot entirely do without them, as they are far more intelligent than the kafirs and help on our industries as carpenters, blacksmiths, engine drivers, sugar boilers, &c. In my sugar factory I employ 100 hands, four engines going, and many complicated pieces of machinery running, and I have, say one European in charge of this staff. It would be impossible to manufacture sugar at a paying price if we had to employ Europeans instead of coolies, and we could not work at all if we solely depended on the scientific ability of the kafir.

Mr. Yonge would have us pay more for manufacture than we now do. But does Mr. Yonge seriously put forward the fact that this coolie introduction is costing the country anything? If he does it is simply to give some sort of attraction to his arguments. The planters have introduced of their own cost an industrious, useful people who have raised kitchen garden produce, mealies, &c., in full supply, and which would be missed if we had to depend on the kafirs, as in times gone by. The coolie rents lands along the coast; by the cultivation of the soil he contributes to the welfare of the country. Then, again, look into every household and see how the coolie at low wages contributes to the daily wants and comforts of the people. If these coolies had not been introduced by the planters, how could the European population of this country have so benefitted?

Now, as a planter, I consider the coolie as a field labourer far too expensive for sugar cultivation. His cost of introduction at £20, his wages and food, then the medical fees £120, and hospital and medicines another £120; then the absconders and shirkers of labour, and loss from death, make me interested in obtaining cheap labour. I am with Mr. Yonge against the introduction of foreign coloured labour, provided he can ensure to the sugar industries a supply of the labour of the country; but it is annoying to employers of labour to have uncertainties of supply. I have always been, and am now, strongly against the introduction of any labour if we can have an available supply from our own surrounding native tribes.

Some 10 or 12 years ago I was a fellow-voyager with Sir Theo. Shepstone, and I remember then expressing myself against the inertness of the ruling powers as regards our natives, in not having arrived at a method of dealing with kafirs to induce them to work. Mild and persuasive legislation would ultimately have brought the kafir to see that as we, the white population, are industrious and become possessed of property, so they could. He made answer, "Ah, you argue as a sugar planter; but the kafir has rights of liberty." The reply was to this effect, concise and indelibly fixed in my memory, and on my arrival in England I made representations to the Colonial Office, urging that the condition of the natives on the locations was against their ever being brought to understand that toil and industry was part of a man's duty amongst civilised people. I also touched on the subject of the breaking up of locations and Church missions, which Colonial Secretaries would prefer leaving alone. I was most patiently listened to, but there the matter ended, and from that time, although I have seen in your paper articles on the subject, I have not heard that the Home Government have considered the advisability or otherwise of putting the Natal natives into working form.

But surely, here is Mr. Yonge's opportunity in discussing the merit of this coolie Bill. The labour supply, on which our industries depend, must be discussed, and possibly the public will stir themselves to secure what everyone must desire, a supply of our own native labour. The planters have at their own expense brought the coolie to this country. They live on rice, and if the coolie had not been introduced, rice would not have been imported to this country, and therefore no revenue, such as is now raised by taxing it at 1s. 6d. a bag, could have been obtained. I am informed that this revenue amounts to £7,000, and other coolie necessaries, such as dholl, oil, &c. bring the Custom duties up to nearly the £10,000 which Mr. Yonge is so desirous of discontinuing, and which Mr. Yonge erroneously tells the country folks is contributed from public funds.

I am, &c.,

Daniel de Pass.

SACCHARINE.

According to an article of M. Ch. Girard, in the *Revue Scientifique* of July 7th, saccharine at present costs 134 fr. per kilo., or about 49s. per lb. Glucose costs, including the excise duty, 50 fr. per 100 kilos., or about 20s. per cwt. Adding 100 gr. of saccharine, the 100 kilos. of glucose would cost about 54 fr. (about 21s. 8d. per cwt.), and would take the place of an equal quantity of beetroot sugar, worth about 105 fr., or about 42s., per cwt. This would give to those using the fraudulent compound a clear gain of 51 fr. per 100 kilos., or about 20s. 4d. per cwt.

M. Girard calculates that about 60 per cent. of the difference would, under present circumstances, be a dead loss to the Treasury, and he urges that a duty of 240 fr. per kilo. (equal to about £4 7s. 6d. per lb.) should be imposed on saccharine, being double the amount of the tax which will be paid next year by the 300 kilos. of sugar which it will replace.

BARON HENRY DE WORMS ON BOUNTIES.

Baron de Worms has sent the following letter in reply to a copy of a resolution adopted at a meeting, recently held, of working men at Nottingham:—

Downing Street, June 28th, 1888.

Dear Sir,—I am much obliged to you for your letter of the 26th, expressing the satisfaction of a meeting of working men in regard to our endeavour to abolish sugar bounties. In the course they have pursued I am sure the Government have been animated by a sincere desire to remove the acknowledged injustice which foreign States' subsidies inflict on the British industrial classes. You, in Nottingham, have, unhappily, experienced no small measure of this injustice, and I do not wonder that you should now, with all the strength of your organisations, concentrate your energies on the termination of the evil. In doing so, it is important that you should bear in mind that the blight which, through the bounties, is now cast on our sugar trade may at any time extend its pernicious influence. As a matter of fact, we have before us evidence that indulging a fallacious belief in the value of subsidies, in the promotion of national industries, foreign governments are by no means disinclined to do for other branches of commerce what they have done for the sugar trade. Bounties may be given by foreign countries on coal, iron, wool, or on manufactured goods. We must, therefore, use our utmost endeavours to put an effectual check on the bounty system. The present is an opportune moment for seeking that end. Especially encouraging is the attitude of the toiling masses, whose interest in the question is beyond dispute. In legitimate competition they have nothing to lose, nor has the consumer. What has to be contended against in the sugar trade is competition of an illegitimate and artificial character, against which the known skill and energy of the English artisan can be of small avail. I reckon it no small privilege to be associated with a project designed to secure a fairer field for the exercise of that energy and that skill, as well as for the more useful employment of capital. In proportion as we succeed will be the measure of benefit to the thousands who are dependent on the existence of the sugar industry.

Faithfully yours,

H. De Worms.

THE APPLICATION OF THE DIFFUSION PROCESS IN BRAZIL.

In August, 1887, a Commission was appointed by the Brazilian Minister of Agriculture to study the results of the application of the diffusion system and other matters bearing on the sugar industry of that country. The facts stated in this report are interesting as bearing upon the possible future of the sugar-cane as opposed to the beet.

According to the report the cane grown at Rio de Janeiro contains about 90 per cent. of juice and from 13 to 20 per cent. of sugar, the juice being more abundant, richer, and more free from impurity in proportion to the quality of the soil on which it is grown, (dependent on its not being exposed to inundation), and to the dryness of the weather at the time of maturing. All the problems relating to the cultivation of the cane must be considered as up to now practically unsolved, and must be investigated at agricultural stations, the establishment of which is recommended.

The apparatus used for cutting is considered on the whole satisfactory. Diffusion vats holding 2,000 to 3,000 litres (440 to 660 gallons), with heating apparatus of 7·2 square metres (77 square feet) surface, are considered the best.

The juice from diffusion is said to be more free from impurity than that obtained by crushing; it can be got in as concentrated a state as by the latter process, and contains almost all the sugar of the cane, inasmuch as there only remains in the sliced canes 1 per cent. (against 3 per cent. in the case of crushing), and the total loss, exclusive of the sugar of the molasses, is, under otherwise equal conditions, only as 1 to 2½. The purity of the juice is materially increased by carbonic or sulphurous acids, and by the use of these and careful boiling and the centrifugal apparatus, sugars can be produced sufficiently dry and containing a low enough proportion of glucose to make them keep better in damp sea air, and be less exposed to deliquescence than those formerly manufactured.

Special experiments prove that diffusion requires no very large consumption of fuel, even where the bagasse is not employed for this purpose. It is therefore considered advisable, as the bagasse contains a large quantity of water, to use it along with the other waste products as manure. Up to now only 12 per cent. of the sugar in the cane had been obtained by diffusion, but this percentage, it was considered, would undoubtedly in a very short time be very materially increased by better cultivation and manufacture.

The Commission is of opinion that the cost of production in Brazil can be brought down to a figure which will enable the manufacture to meet any competition, *and considers that the conflict between cane and beet must eventually prove fatal to the latter, as it only exists by favour of artificial means devised by European countries.*

The cost of production, as indicated by the report, is at Quissaman $4·517 (about 18s.); at Barcellos $6 (about 24s.) per ton. On the other hand the cost at the smaller factories is only about $2 (8s.). The Commission thinks that by improved cultivation and manufacture the cost of the cane can be brought down to $4; the cost of manufacture being $3, and adding $1 for the sinking fund, repairs, &c., the total outlay per ton of cane would be $8, or about 32s. Supposing the yield in sugar to be 198lb., and the yield in molasses 110lb., the latter being worth $3 (12s.), the 198lb. of sugar would cost $5, equal to nearly 11s. 4d. per cwt. The amount of chemically pure sugar obtained is taken at 9 per cent.

The *Journal des Fabricants de Sucre* remarks:—

The above estimate does not appear to us in any way exaggerated. It is evident that the yield of 9% of sugar, which has been assumed, is very much below the maximum limit which could be attained by diffusion in working with cane containing 17 to 19 per cent. of sugar, as is the case with certain varieties cultivated at Barcellos. On the other hand, it is perfectly logical to suppose that the adoption of improved methods of cultivation will result in increasing the qualitative and quantitative yield of the crop, which would still further reduce the cost price.

In the province of Rio the cane can be easily obtained at $4 (16s.) a ton; in the northern provinces labour is cheaper, and the cane costs less there. At Rio, where wages are highest, the cost of cultivating a hectare (2½ acres) of land, yielding 80,000 kilogs. (nearly 79 tons) of cane, is $248, which brings the price to $3·10, or 12s. 5d. per ton. The shoots of the first year only require going over twice, and, employing the plough and the cultivator, the expense is only $148 for the 80,000 kilogs. of cane, equal to $1·85, or 7s. 5d. per ton. And these results are obtained in the alluvial soil of the province of Rio, without any manure. These few figures are sufficient to show any man acquainted with the trade how formidable the competition of Brazilian sugar may become. For our part we believe it would not require any great effort to reduce by 20 to 25 per cent. the cost price indicated above; and this would put it out of the power of a large number of beetroot sugar manufacturers to maintain the competition.—From the *Cöthen Chemiker Zeitung* and the *Journal des Fabricants de Sucre.*

COLONISTS AND THE LEGACY DUTY.

The following unfavourable reply has been sent to a memorial addressed by the Council of the Royal Colonial Institute to the Chancellor of the Exchequer:—

"Treasury Chambers, July 13, 1888.

"Sir,—The Lords Commissioners of her Majesty's Treasury have had under their careful consideration the memorial addressed by the Council of the Royal Colonial Institute to the Chancellor of the Exchequer on the 22nd of November last, urging the exemption from legacy duty of such personal property belonging to persons dying domiciled in the United Kingdom as may be situate outside of this country.

"The decision at which my Lords have arrived, after a prolonged and close examination of this important subject, has been already stated in the House of Commons, in reply to a question put by Sir George Baden-Powell to the Chancellor of the Exchequer on the 4th of June last; but they feel that it is due to the Council of the Royal Colonial Institute to put that decision and their reasons for it on record in a somewhat more formal manner.

"The determining element at present in deciding whether or not personal estate other than settled personality is liable to legacy and succession duty is, as the Council point out, the domicile of the deceased. If a person dies domiciled in the United Kingdom, his personal estate, wherever, situate, is liable to duty; and, on the other hand, personal property situate in this country is exempt, if belonging to a person dying domiciled abroad. For this principle—the domicile of the deceased—the Council would substitute another—the locality of the estate; and they ask for such an amendment of the Legacy Duty Acts as would subject to duty all personal property situate in this country, whatever be the domicile of the deceased owner, and, on the other hand, exempt from duty all personal property situate outside of the United Kingdom, even if the deceased be domiciled in this country.

"My Lords regret that they cannot see their way to adopt the suggestion of the Council, which involves a reversal of several important principles of taxation, apart from its purely fiscal results. My Lords have not failed to consider what can be urged from the Colonial point of view; but even if on general grounds they were prepared to proceed in the direction desired by the Council, they would be met by difficulties which appear to them insuperable, and be involved in a loss to the Revenue, which they cannot accept.

"That loss would be far from inconsiderable even if the scheme of the Council were adopted in its complete form, but to such complete adoption the gravest obstacles exist.

"The measure to which the Council look to compensate the loss resulting from the exemption from duty of estates now liable—the imposition of the duty on estates situate in this country of persons domiciled elsewhere—is one to which my Lords apprehend that the strongest opposition would be raised. Even if it met with the approval of every Colonial Legislature, as well as of the Imperial Parliament—and my Lords are by no means convinced that this indispensable approval would be readily forthcoming—the change which your Council contemplate could not be effected without the danger of Involving this country in very awkward controversies with foreign Governments, as their subjects, and not Colonists only, would be affected by the alteration.

"It seems probable, therefore, that the loss which would have to be faced would not merely be that caused by the adoption of the scheme in its entirety, but the much more serious loss caused by the exemption from duty of estates now subject to it, without the compensatory provision which the Council suggest.

"This risk is not one which my Lords are prepared to incur, and on a review of all the arguments on both sides, they do not feel able to accept the system recommended by the Council.

"I am, Sir, your obedient servant,

"W. L. Jackson.

"The Secretary, Royal Colonial Institute,
Northumberland Avenue."

(*Continued from page 404.*)

to 8s. per ton, with a tax upon sugar entering into consumption of 5s per cwt. The reduction in the premium is about 40%, taking the proportion of sugar extracted at 12%.

The new law regulating the sugar tax in France has, in spite of the vehement protests of all those interested in the cultivation of beets and the manufacture and refining of sugar, been voted successively by the Chamber of Deputies and the Senate by considerable majorities. The financial necessities of the Treasury have outweighed what, from a French point of view, would seem to be the profit and well-being of this great industry. Judging by the philosophical tone of the French journals, it would appear as though the advantages derived from the extraordinarily favourable legislation of 1884 would still enable agriculturalists, but especially manufacturers and refiners, to feather their nests at the expense of the nation. The effect of the new legislation, which comes into force at once, is to alter the duty on all sugars from 50 to 40 francs per 100 kilos. of refined, to impose a temporary surtax of 50% on all sugars, to put on those sugars hitherto exempt from duty, under the title of *déchets de fabrication* or *excédants de rendement*, a special equivalent tax, payable on their issue from the factories, of 20 fr. per 100 kilos. of refined, and to maintain the existing surtaxes on colonial and foreign sugars. Sugars of the present campaign will remain subject to the old regulations until 31st December, 1888.

Respecting the London Congress, the *Deutsche Zucker Industrie* says various statements are beginning to obtain publicity with regard to the positions taken up by some of the powers who have taken part in the Congress.

As regards Austria-Hungary, Count Kuefstein is said to have been authorised to declare that his government is in principle disposed to do away with the sugar premiums within a certain time, but the position of refusing to participate adopted by America, which by increased production might in future greatly influence the position of the international sugar market, scarcely admits any hope of a speedy practical adoption of the proposed regulations, including as they do the whole of the powers concerned.

Italy, it is stated, is inclined to accept the conclusions arrived at by the Congress, with some unimportant reservations.

The *Sucrerie Belge* sums up the position as follows.—"As matters stand at present, there is but one attitude for France and Belgium to observe, and this consists in just letting the other countries do as they like, allowing them to enter into whatever engagements they choose to undertake with England, and, on the other hand, leaving the English Government to present to the country an incomplete convention. It will then be interesting to see whether, in order to obtain the international agreement, England is willing to forego that immense market for sugars of which she at present has the monopoly, to deprive her industries and her consumers of the considerable advantages which they thereby obtain, and to sacrifice the great economical principles in which she has gloried for a long series of years."

M. Léon Say, who is justly considered as the most capable exponent of the views of French sugar manufacturers and refiners, lately said, in a speech delivered at Pontoise:—"England puts no duties on sugar, she receives all the sugars of Europe free of duty; possibly she is dissatisfied with the fact that those sugars compete in her market with the produce of her colonies: that matters little to us. Are we going to give England the right to punish those European countries which give premium to their sugar manufacturers, just because the English colonies are crying out? Would you think it right that under the pretext that France allows a higher premium than another nation, England should tax her sugars four, five, or six francs per 100 kilos. more than the others—that she should lay a less burden on German sugars, and still less on some others?" M. Say says that other countries have requested England, which is accustomed to horse-racing, to organise a sugar *handicap*, but he has no confidence in England as handicapper, and is not disposed to confide to the English parliament the duty of making laws for France.

The *Sucrerie Indigène*, after bewailing the passing of the new law, says:—

"This is not all. During the debate the ministry was several times appealed to for an explanation of the intentions of the government with regard to the ultimate action to be taken respecting the London Conference, but they constantly declined to be drawn into any statements. This silence, and the information gathered here and there, lead us to believe that the convention will be signed by France. The report has indeed reached us that M. Goblet has signed it. True, it is stated that he informed a *ci-devant* ambassador that his signature is merely 'provisional,' but this latter individual has not yet managed to explain what may be the meaning of a 'provisional' signature at the foot of a diplomatic document."

The *Magdeburg Zeitung* states that it may be considered as certain that Baron de Worms has succeeded in obtaining the assent *in toto* of the German government to the preliminary conclusions of the London Conference.

The Louisiana Sugar Planters' Association have just published an interesting synopsis of the crop reports for the season just closed, which will be found opposite page 456. The yield of sugar in pounds per ton (2000 lbs.) of cane is as follows:—

	Tons Cane worked.	Average Pounds per Ton.
Gov. H. C. Warmoth (diffusion)	913	201·26
Gov. H. C. Warmoth (mill)	12,431	179·93
Gov. H. C. Warmoth (ave. mill and diffusion)	....	181
Daniel Thompson	14,591	177
George P. Anderton	7,398	162·50
Cartwright Eustis	10,855	156·50
John Dymond	12,211	139·77
S. M. Swenson	17,900	134
Payne Pettebone, J. Peters, agent	10,440	132·75
R. Viterbo	11,818	131·79
McCall Bros.	22,757	123·94
Mrs. E. Bourbon	9,806	113·25
Lemann & Lum	15,426	110
E. M. Rusha	8,385	106
G. B. Reuss	11,716	102
Emile Legendre	13,420	102
Leonce M. Soniat	7,579	96·33

Many plantations do not weigh their cane; hence the above are all that can be usefully specified.

LOSS ON THE POSTAL TELEGRAPH SYSTEM.

Three Millions in Fifteen Years.

The report of the Select Committee on Revenue Departments' Estimates offers some remarks as to the financial result from the postal telegraph system. They state that the total deficiency of income to meet expenditure and interest at 3 per cent. on the capital created on account of the Post Office Telegraphs from 1st January, 1872, to 31st March, 1887, amounted to no less than £3,024,889. The deficiency has latterly been increasing year by year, and for the last year of which the accounts are included in this return was £471,889. The unprofitable character of this Government business has been attributed to the high price originally paid for the purchase of telegraphs by the State, to the enormous increase of services gratuitously performed for the railway companies, to the tariff under which Press messages are sent, causing a loss amounting to nearly £200,000 a year, to unproductive work done for other departments, and to public pressure to improve the service, even at a loss.

With regard to the administration of the General Post Office, the committee pointed out that the penny letter was the great, if not exclusive, source of annual profit. There was a loss on the transmission of newspapers, and on all halfpenny business. It was doubtful whether any profit was derived from the Parcel Post.

YIELD OF THE SUGAR CANE IN MARTINIQUE, 1884 TO 1888.

The following statistics, relating to eighteen sugar factories, are taken from *Les Antilles* by the *Sucrerie Indigenè* :—

	1884.	1885.	1886.	1887.	1888.
Quantity of canes worked up .... tons	484,000	395,000	382,470	463,000	459,300
Average yield..per cent.	7·90	7·93	7·36	8·40	7·50
White sugar produced, tons	37,600	31,323	28,152	38,940	34,447
Raw sugar produced, tons	14,472	?	?	4,988	?
Tafia (Rum) exported, litres	17,624,000	17,624,000	17,660,000	18,823,863	?
Tafia (Rum) consumed in the island ..litres	?	?	?	8,000,000	?

The yield and quantity for 1888 are approximate calculations, as the manufacture is not yet completed. The manufacture of raw sugar goes on all the year round.

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, July 12th, 1888.

FAIR REFINING.	96o/o CENTFS.	GRANULATED.	STAND. A.	STOCK IN FOUR PORTS.
July 12, 1888.—4 15-16c.	6c.	7½ 9-16c.	7c.	Jan. 1, 1888— 47,798 tons.
July 14, 1887.—4 7-16c.	5 3-16c.	5⅞c.	5½c.	Jan. 1, 1887—102,279 tons.
July 15, 1886.—4⅞c.	5½c.	6 3-16.	5 11-16-¾c.	Jan. 1, 1886— 57,328 tons.
July 16, 1885.—5¼c.	6⅛c.	6 9-16-⅝c.	6¼c.	Jan. 1, 1885— 89,186 tons.
July 10, 1884.—5c.	5 15-16c.	6⅞c.	6 9-16c.	Jan. 1, 1884— 60,900 tons.
July 12, 1883.—6 11-16c.	7 9-16c.	8 13-16c.	8¼c.	Jan. 1, 1883— 50,297 tons.
July 13, 1882.—7¼c.	8 1-16c.	9 5-16c.	8⅞c.	Jan. 1, 1882— 43,927 tons.
July 14, 1881.—7⅞c.	8⅝c.	10¼c.	9¾c.	Jan. 1, 1881— 66,999 tons.
July 8, 1880.—7 11-16c.	9c.	9⅞c.	9⅝c.	Jan. 1, 1880— 63,558 tons.
July 10, 1879.—6½c.	7¼c.	8½-⅝c.	8⅛-¼c.	Jan. 1, 1879— 50,773 tons.
July 11, 1878.—7 3-16c.	8c.	9½c.	9⅛c.	Jan. 1, 1878— 48,230 tons.
July 12, 1877.—9½c.	10 9-16c.	11¾c.	11⅜c.	Jan. 1, 1877— 25,885 tons.

ESTIMATE OF THE PRINCIPAL CANE SUGAR CROPS,

Compared with the Exports in previous Six Years, 1881-82 to 1886-87.

	1887-88.	1886-87.	1885-86.	1884-85.	1883-84.	1882-83.	1881-82.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Cuba	610,000	608,900	705,400	630,800	560,900	485,000	500,300
Porto Rico	75,000	86,000	64,000	70,000	98,600	70,000	80,000
Trinidad	60,000	69,000	49,200	65,700	59,800	54,000	53,400
Barbados	60,000	65,000	44,000	60,700	56,000	52,000	53,000
Jamaica	30,000	21,000	17,000	25,000	29,500	25,000	27,000
Antigua and St. Kitt's	26,000	25,000	25,000	20,000	23,000	16,000	23,000
Martinique	42,000	41,000	33,000	38,800	49,400	46,800	47,800
Guadeloupe	50,000	55,000	37,000	41,200	55,300	52,000	57,000
Demerara	125,000	135,000	111,800	96,000	126,000	117,000	124,200
Reunion	32,000	32,000	35,000	36,500	37,800	34,000	25,000
Mauritius	120,000	101,800	114,200	128,000	120,400	116,700	118,000
Java	380,000	363,950	365,950	374,400	311,400	283,600	273,000
British India	55,000	50,000	50,000	45,000	60,000	87,000	66,000
Brazils	320,000	260,000	186,000	269,000	359,000	218,000	304,400
Manilla, Cebu, and Iloilo	170,000	180,000	186,000	203,400	122,000	211,600	151,500
Louisiana	135,000	80,900	127,900	94,500	128,400	135,300	71,400
Peru	30,000	26,000	27,000	35,000	25,000	31,000	40,000
Egypt	50,000	50,000	65,000	41,000	37,000	21,000	32,000
Sandwich Islands	100,000	95,000	96,500	76,500	63,700	51,000	50,900
Total of Cane	2,470,000	2,345,550	2,339,950	2,351,500	2,323,200	2,107,000	2,097,900
,, Beet	2,399,500	2,728,800	2,216,600	2,546,000	2,361,000	2,147,000	1,861,000
Cane and Beet	4,869,500	5,074,350	4,556,550	4,897,500	4,684,200	4,254,000	3,958,900

H. Clark & Co.'s Monthly Circular, 9th July, 1888.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

January 1st to June 30th, 1887-1888.

Board of Trade Returns.

IMPORTS.

Raw Sugars.	Quantities.		Value.	
	1887.	1888.	1887.	1888.
	Cwts.	Cwts.	£	£
Germany	3,435,170	1,992,724	1,844,203	1,328,757
Holland	202,094	145,434	109,547	96,818
Belgium	467,958	377,986	244,418	245,993
France	17,172	2,080	10,318	1,710
British West Indies & Guiana	1,473,304	1,366,038	1,050,826	1,096,399
British East Indies	174,867	653,642	79,732	313,377
China and Hong Kong	312	....	201	....
Mauritius	58,640	133,015	30,160	94,505
Spanish West India Islands	104,466	303,938	62,800	222,923
Brazil	384,722	1,802,258	202,345	1,141,274
Java	2,357,828	2,406,128	1,537,685	1,835,271
Philippine Islands	153,643	278,531	70,020	189,200
Peru	199,855	222,309	122,081	167,648
Other Countries	295,459	320,486	166,732	226,110
Total of Raw Sugars	9,325,490	10,004,569	5,531,068	6,909,985
Molasses	172,246	221,555	52,641	68,100
Total Sugar and Molasses	....	....	5,583,709	6,978,085
Refined Sugars.				
Germany	1,404,027	1,583,529	1,075,283	1,380,010
Holland	686,012	629,867	531,729	574,849
Belgium	96,278	108,183	78,631	103,416
France	756,020	418,932	563,050	381,059
United States	657,043	29,425	524,283	27,788
Other Countries	9,164	250,090	6,617	196,326
Total of Refined	3,608,544	3,020,026	2,779,593	2,663,448

EXPORTS.—Refined Sugars.

	Cwts.	Cwts.	£	£
Sweden and Norway	35,746	29,270	24,394	24,414
Denmark	57,848	41,294	30,955	30,503
Holland	32,388	40,740	21,047	30,092
Belgium	21,460	13,674	13,002	9,891
France	22,101	3,551	13,586	2,508
Portugal, Azores, & Madeira	52,685	42,898	29,927	31,708
Italy	42,711	43,257	25,946	32,114
Other Countries	96,545	87,279	63,864	69,920
Total of Refined	361,484	301,963	222,721	231,150

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of June, 1888, compared with the corresponding month of the two preceding years, and the average monthly imports for the year compared with those of 1885, 1886, and 1887, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

Countries from which Sugar has been imported.	"Lumps and Loaves."							"Other Sorts." Including Crushed Loaf, Granulated, Crystallized, &c.							Total.						
	Monthly Average.				June	June	June	Monthly Average.				June	June	June	Monthly Average.				June.	June.	June.
	1885	1886	1887	1888	1886	1887	1888	1885	1886	1887	1888	1886	1887	1888	1885	1886	1887	1888	1886	1887	1888
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
France	1597	1462	1363	1818	1349	1394	1567	463	2688	5099	1673	809	7081	905	2060	4150	6462	3491	2158	8475	2172
Holland	3848	3508	3780	2786	4325	4242	4235	1472	1428	2483	2462	1705	2586	2735	5320	4936	6263	5248	6030	6828	6970
Germany & Austria	808	990	1347	1490	1315	1321	1503	3262	6634	10463	11706	5213	11283	12510	4070	7624	11810	13196	6528	12604	14013
Belgium	189	344	592	650	208	989	414	120	113	308	252	44	282	320	309	457	900	902	252	1271	734
United States	707	854	454	7	140	968	..	8869	5078	2804	238	1229	3290	186	9576	5932	3258	245	1369	4258	186
Russia	..	..	3	..	..	30	..	875	3412	452	2084	..	425	2463	875	3412	455	2084	..	455	2463
Other Countries	1	..	..	..	..	..	..	21	9	15	1	11	..	4	25	9	15	1	11	..	4
Total	7150	7158	7539	6751	7337	8944	7719	15085	19362	21624	18416	9011	24947	19123	22235	26520	29163	25167	16348	33891	26842

SUGAR STATISTICS—GREAT BRITAIN.

To July 21st, 1888 and 1887. In Thousands of Tons, to the nearest Thousand.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1888.	1887.	1888.	1887.	1888.	1887.
London	76	84	160	172	182	180
Liverpool ..	153	90	157	144	225	157
Bristol	5	4	28	35	29	36
Clyde	45	53	133	124	135	141
Total ..	279	231	478	475	571	514
	Increase..	48	Increase..	3	Increase..	57

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

For the four principal Ports. In Thousands of Tons, to the nearest Thousand. For June, 1888 and 1887.

	STOCKS. July 2nd.		DELIVERIES. In June.		IMPORTS. In June.	
	1888.	1887.	1888.	1887.	1888.	1887.
New York	119	160	69	61	68	88
Boston	19	21	15	18	18	18
Philadelphia....	6	4	34	13	35	13
Baltimore	..	..	..	..	..	..
Total......	144	185	118	92	121	119
	Decrease..	41	Increase..	26	Increase ..	2
Total for the year (1888)..			523	625	619	707

Stocks of Sugar in the Chief Markets of Europe on the 30th June, for Three Years, in thousands of tons, to the nearest thousand.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts.*	Total 1888.	Total 1887.	Total 1886.
258	*145	8	*94	58	19	582	594	752

*Estimated.

Consumption of Sugar in Europe for Three Years, ending 30th June, in thousands of tons, to the nearest thousand.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts.*	Total 1888.	Total 1887.	Total 1886.
1211	404	44	436	222	339	2656	2733	2378

Estimated Crop of Beet Root Sugar on the Continent of Europe for the present Campaign, compared with the actual crop, of the three previous Campaigns.

(From Licht's Monthly Circular.)

	1888-89. Tons.	1887-88. Tons.	1886-87. Tons.	1885-86 Tons.
France	445,000	405,000	486,443	298,407
German Empire	990,000	937,000	1,018,842	838,131
Austro-Hungary	575,000	412,500	523,060	377,032
Russia and Poland.	450,000	430,000	479,582	537,860
Belgium	160,000	135,000	132,570	88,421
Holland	43,000	36,000	32,263	21,214
Other Countries	62,000	56,050	56,050	55,500
Total	2,725,000	2,412,050	2,728,810	2,216,595

Mr. Licht has increased his estimate for last crop (1887-8) by 12,500 tons, and for the present campaign (1888-89) he gives an increase of 135,000 tons, viz., France, 20,000 tons; Germany, 15,000 tons; Austria, 80,000 tons; Russia, 20,000 tons.

The present estimate of crop 1888-89, compared with the revised estimate of previous crop (1887-88), point to an increase of 312,950 tons

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

The market for raw sugars for July has been disappointing. During the first fortnight beet 88% advanced 9d. per cwt., which has since been lost—the present quotation for prompt sugar being 13s. 10½d. to 14s. The London Produce Clearing House quote for forward delivery, 12s. 4½d. per cwt. November, December; 12s. 6d. January; 12s. 6½d. February; and 12s. 8¼d. for March.

The refined market has been fairly steady throughout the month.

Mr. Licht's estimate for 1888-89 crop is raised to 2,725,000 tons, or 135,000 tons more than he put it at a month ago. Mr. Görz's estimate is 2,660,000 tons.

The stocks in this country are 47,546 tons in excess of those at the same date last year. This may be accounted for by shipments having been made to Liverpool, which, under ordinary circumstances, would have gone to the United States, and which will, in all probability, have to be re-shipped during the next few weeks. The latest advices from New York are cheering, as regards values. Stocks there are, in all hands, very much reduced, and the "trust" will now have to fall back upon Europe to make out the requisite supplies. A "corner" in sugar, it is reported, is about to be made in the United States. The advocates of "free sugar" can wish for nothing better than such an event.

The deliveries in the United Kingdom (four principal ports) up to the 21st July, as compared with last year, show an increase of 2,969 tons, and the imports an increase of 56,980 tons.

The stocks in the United Kingdom (four principal ports) on the 21st July were 278,478 tons, against 230,932 tons in 1887, or an increase of 47,546 tons. The stock in Liverpool, as compared with last year, shows an increase of 62,849 tons.

Present quotations for the standard qualities, as under, are:—

Floating.			Last Month.
Porto Rico, fair to good Refining	14/–	against	13/- to 13/6.
Cuba Centrifugals, 96°/₀ polarization	15/– to 15/6	,,	14/9.
Cuba Muscovados, fair to good Refining..	14/–	,,	13/– to 13/6.
Java, No. 15 to 16, good to strong	15/9 to 16/–	,,	15/6 to 15/9.

Landed.			Last Month.
Madras Cane Jaggery..	8/9	against	9/–
Manila Cebu and Ilo Ilo	8/9 to 9/–	,,	9/– to 9/6.

Paris Loaves. f.o.b.	18/6 to 18/9	against	18/–
Titlers	20/3	,,	20/3
Tate's Cubes..	21/–	,,	21/3
Austrian-German Beetroot, 88 °/₀ f.o.b. ..	13/10½ to 14/-	,,	14/–

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LOUISIANA SUGAR PLANTERS' ASSOCIATION.—TABULATED REPORT FOR THE SEASON OF 1887-8.

PLANTER.	PLANTATION.	PARISH.	Tons of Cane worked.	Per cent. Juice.	Gallons Juice.	Pounds of Juice.	Hogsheads Sugar.	Barrels Sugar.	First Sugar.	Second Sugar.	Third Sugar.	Total Pounds Sugar.	Pounds Sugar per ton Cane.	Barrels Molasses.	Gallons Molasses.	Pounds Molasses.	Per cent. Sugar per ton.	Per cent. Molasses per ton.	Per cent. Masse Cuite per ton.	Acres Cane Ground, Less ditches and headlands.	Acres Plant Cane.	Acres First Stubble.	Acres Second Stubble.	Average Tonnage per acre.	Mill, Single or Double.	Size of Rollers.	Hydraulic Pressure, with or without.	Water or Steam used between 1st and 2nd Rollers.	REMARKS.
Gov. H. C. Warmoth (by diffusion)	Magnolia	Plaquemines.	913						121,964 lbs.	47,699	14,653	184,316	201·26				10·06												2nd sugar 31,764 gd.; 15,935 wagons. Av. 1st 133·58; 2nd gd. 34·17; 2nd w. 17·46; 3rd w. 16·05.
Gov. H. C. Warmoth (by mill)	Magnolia	Plaquemines.	12,431	78·94		19,626,062			1,537,156 ..	500,054	199,525	2,236,735	179·93				8·998												2nd, 188,720 gd.; 311,334 wag. Av. 1st, 124·45; 2nd gd. 15·18; 2nd w. 25·05; 3rd 16·05.
Gov. H. C. Warmoth (by mill and diffusion)	Magnolia	Plaquemines.	13,314						1,659,120 ..	547,753	214,178	2,421,051	181·43		58,350	671,025	9·072	2·698	11·77	604	275	212	87	22·09					Av. sug. per acre 4,028 lbs.; av. mol. 1,110; total 5,138 gals. to 1,000 lbs. sug. 21·10.
Mr. Daniel Thompson	Calumet	St. Mary	14,591	74·60	2,456,281	21,771,813		7,631	1,820,670 ..	624,116	137,846	2,582,632	177	1,324	65,700	755,550	8·85	2·589	11·439	610	350	290		21·83	Double	30 x 60 & 40 x 66	Without	Neither	619¾ tons cane purchased, ¾ 2nd mol. only boiled for 3ds. Crop blown prostrate Sept. 16, while yet rapidly growing.
Mr. George P. Anderton	Concession	Plaquemines.	7,398	70 [1st 8]				3,162				1,202,175	162·50	669	33,450	384,675	8·25			410	230	160	20	18	Double	48 x 26½	On 1 mill	Neither	Yield 1st sug. 70 per cent.; grade princ. Off white, gal. mol. per 1,000 lbs. sug. 27¾.
Mr. Cartwright Eustis	Fuselier	St. Mary	10,855	75	1,860,987	16,283,635		4,835	981,354 ..	520,156	195,816	1,697,656	156·50	1,061	53,783	618,505	7·82	2·85	10·67	670½ arp	416 arp	254½ arp		15·25 arp		27 x 54 & 36 x 60	Without	Water heated by steam	2ds gran. in pan; bot. 637 tons cane. Water bet. mills increased per cent. extraction.
Mr. John Dymond	Belair	Plaquemines.	12,211	72·68	2,028,658	17,750,757		5,289	1,544,597 ..	162,111		1,706,708	139·77	805	40,250	462,875	7	1·9	8·9	600				20	Double	30 x 60	With	None	Av. masse cuite, per ton, 177·68 lbs.
Mr. S. M. Swenson	North Bend	St. Mary	17,900					7,272	4,111 bbls.	2,046 bbls.	1,115 est.	2,400,000 est.	134							650	438	212		27	Single	32 x 60	Without	None	3ds unfinished at date of report.
Mr. Payne Pettebone (J. Peters, Agent)	Keystone	St. Martin	10,440					4,116	890,734 lbs.	445,366 lbs.	50,000 est.	1,386,100	132·75	1,516	75,800	871,700	6·637	4·12	10·757						Double	60 x 30 & 63 x 36	On 1st mill		
Mr. R. Viterbo	Edmee	St. Charles	11,818	70·15	1,895,010	16,581,267		1,582	1,112,641 ..	445,066 ..		1,557,707	131·79	1,070	53,550	615, 25	6·58	2·6	9·18	553	387	166		20·25	Double	60 x 31 & 60 x 44	On 1st mill	Nothing	
Messrs. McCall Bros.	Evan Hall	Ascension	22,757	75·54	3,902,645	34,379,152		8,145	2,277,710 ..	542,866 ..		2,820,576	123·94	2,974	151,360	1,799,670	6·20	3·95	10·15	931	504	430		24·36	Double	32 x 72 & 41 x 81	On 1st mill	None	No allowance made for cane trash.
Mrs. E. Bourbon	Star	St. Charles	9,806					3,393	2,578 bbls.	815 bbls.		1,110,000	113·35	1,103	56,462	649,313				206	155	50	31 tons	33 pl, 13 st.	Double	54 & 60 x 34	Without	Nothing	Grinding began 4th of October, ended 17th Dec. Av. 158 tons per 24 hours. Plant cane fine, stubble inferior. Purchased 4,010 tons cane.
Messrs. Lemann & Lum	Palo Alto	Ascension	15,426					5,150	3,988 ..	1,162 ..		1,700,000	110	2,100	105,000	1,207,500				610	300	310			Double	51 x 48			
Mr. E. M. Rusha	Old Hickory	Iberville	8,385				715					899,539	106	1,237	62,599	718,878				420	266	154		19·2	Single	60 x 30	With		
Mr. G. B. Reuss	Germania	Ascension	11,716¾									1,193,874	102	1,756						410	345	65		28·56	Double	36 x 66 & 41 x 72	Without	None	Juice from 7½ to 8 Baumé; small yield per ton, due to defective housing mill.
Mr. Emile Legendre	Terre Haute	St. John	13,420									1,370,000	102	1,775	88,760					440	260	180		30·5	Double		Without		Bot. 1,600 tons cane; total 1,545,000 lbs. sugar, inclusive of this.
Mr. Leonce M. Soniat	Cedar Grove	Iberville	7,579	71·50	1,242,337	10,873,105	660	open	kettle			730,000	96·33	1,220	63,440	729,560	4·8	4·8	9·6	253	130	123		30	Single	48 x 28	With	None	Cane very green; good extract, due light reg. feed and shucks cleaned off carrier, hydraulic pressure worked beautifully.
Messrs. Joseph Webre & Co.	Golden Star	St. John					365					438,000		771	38,550	443,325				250	150	100			Single		Without		Canes cut very high; all red left.
Mr. N. K. Todd	Garrett	St. Mary					429							600							106	70			Single	1½ ft.	Without	None	
Mr. M. L. Randolph	Blythewood	Iberville					325							920						200	120	80			Single	25 x 44			Sold 148 tons cane. 34 inch. hhds. used.
Messrs. Hayes & Weems	Emfield	Rapides					336	28		28 lbs.				770						145	125	20			Single	4 ft.			Hogsheads average about 1,200 lbs.
Mr. S. W. Peebles	With tenants	Iberia						450						155						130	50	70			Single	28 x 54	Without		Also made 35 bbls. syrup; 90 bbls. of the sugar was made from bot. cane.

What we should like to see is the net result on the year's working, and the percentage of profit or loss upon the capital invested. This year's crop is the largest since the war (1861), and nearly 70 per cent. larger than the previous year, therefore this year ought to show a good return.—ED. *S. C.*

THE

SUGAR CANE.

No. 230. SEPTEMBER 1, 1888. Vol. XX.

☞ **The writers alone are responsible for their statements.**

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to Henry Thorp, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see page iii.

A meeting of the plenipotentiaries to the Sugar Bounties Conference took place on the 28th ult., at the Foreign Office, and lasted about two hours, Baron H. de Worms, M.P., presiding. The text of the Convention was finally adopted, and the signing of the treaty was definitely fixed to take place the following afternoon, at three o'clock, at the Foreign Office; but up to our going to press we have no certain information as to the final disposal of the treaty.

The Central News understands that the French plenipotentiary to the Conference had informed the other delegates that the French Government desired another year for consideration before signing the Convention. All the other delegates, however, have agreed to sign the Convention.

The following appears in the *Chemiker-Zeitung* (Cöthen) of 19th August:—

"The assertions of Dr. Phipson that certain chemical preparations cannot be done with beet sugar, that organic acids invert beet sugar much more easily than they do cane sugar, and that preserves of good quality can only be made with cane sugar, may certainly in the present day be regarded as a curiosity, and, provided that really pure beet sugar (free from alkali) be employed, are one and all inaccurate, and only to be explained by inveterate prejudice. How great these prejudices even yet are may be learned by Dr. P. from a letter which recently appeared from a preserve manufacturer on the Rhine, who had bought so-called "Dutch sugar," *i.e.*, coarsely boiled and un-blued beet sugar, in the firm belief that it was Dutch Colonial sugar (Java).

"This man stated that this sugar was not only much sweeter than what he had been having before, but had also produced preserves of much finer taste, and which would keep much longer."

The above article having been communicated to Dr. Phipson, he writes us as follows:—

"I thank you for calling my attention to the article in the *Chemiker Zeitung*. I did not *assert* anything; I made the suggestion that cane sugar and beet sugar were *not identical*, and indicated an experiment by which it could be proved. Meanwhile we have the facts of the deterioration of phosphate syrups and the difficulty of making preserves with beet sugar, as compared with cane sugar. I do not think that the presence of a little alkali in the impure beet sugar would account for this, as the writer in the *Chemiker Zeitung* suggests. It would be interesting to ascertain, on this subject, the opinion of the English jam makers, as well as that of "a preserve maker on the Rhine." It is also very remarkable that this German preserve maker was *trying to buy cane sugar* when he bought beet sugar by mistake!

I will solve the problem whether saccharose and betose are *identical* or *isomeric*, so soon as I shall have in my possession one ounce of each product, in the shape of pure, refined, lump sugar, the one certainly from the beetroot and the other as certainly from the sugar cane. Hitherto, I have been (through press of other occupations) unable to obtain samples which, like Cæsar's wife, could be pronounced above suspicion. The *origin* of the samples must be *guaranteed*. The result of the experiment shall appear in your interesting magazine."

London, 24th August, 1888.

We subjoin a further list of the results of German and other European Sugar Companies for the year 1887-88—for the particulars of which we are indebted to the *Deutsche Zuckerindustrie*. Some of the results are very remarkable, and show clearly that if the bounties, so far as Germany is concerned, are aboilshed to-morrow, they are able to produce sugar at present prices, and show a very handsome return. One company shows profits which amount to more than the share capital, another one pays a dividend of 54%, and carries to the reserve fund what is equal to 30%; a third company shows 50%, after writing off a similar sum.

In the July *Sugar Cane* pages 356-361, we gave a list of German Companies, and the results for the previous year (1886-7)—so that our readers can readily, by referring to it, compare present with past results—the average price of 88% beet for 1886-87 was 11/5½; for 1887-8, it was 13/8.

The *Körbisdorf* Sugar Manufactory, which grows more than two-thirds of the beets which it requires, shows a net gain of M. 188,423, of which one-fourth comes from the farming and mining operations. The dividend paid will be 5%.

The *Brehna* Factory, with a share capital of M. 412,000, pays a dividend of 54%, after carrying M. 12,128 to reserve fund! That of *Hedwigsburg*, with a share capital of M. 465,375, shows a net profit of M. 175,267, equal to 37½%! *Barum*, after writing off on special account M. 93,928, still pays, on a capital of about M. 380,000, a dividend of 66⅔%!

Königslutter, with a share capital of M. 240,000, shows a net profit of M. 256,494! *Eichthal*, with a capital of M. 315,000, has gained M. 115,528, after writing off an almost equal sum, viz., M. 112,578. *Dirschau*, with M. 450,000 share capital, pays 36%. *Camburg*, with a capital of M. 700,000, pays 35%.

The following also show profits:—*Aderstedt*, M. 203,712; *Nordstemmen*, M. 187,336; *Wetterau*, M. 130,611 (7% dividend); *Liessau*, M. 74,676; *Rastenburg*, M. 47,067 (10% dividend); *Schnackensleben*, M. 42,776; *Wreschen*, M. 27,000 (4% dividend); and *Equord*, M. 1,017.

The only companies that cannot pay any dividend are those of *Spora*, *Tiegenhof*, and *Trebitz;* while that of *Ceres*, at *Dirschau*, places the whole of its net profits, M. 48,364, to its two reserve funds.

In Bohemia, the *Gross Zinkendorf* Company pays a dividend of 22%; *Modran*, a dividend of 10½%; that of *Predmeritz* 20%, which the *Prager Zuckermarkt* characterises as a distinct proof of the great sugar content of the beet, as this factory only worked up 114,800 metric centner of beets during last year's campaign. The Imperial Sugar Factory of *Swolenowes* made a net profit of fl. 421,000, and the *Brüx* Company fl. 89,610.

From Belgium the following results are announced:—The *St. Joseph* Factory of *Enghien* (Hennegan), with a capital of fr. 707,135, has made a profit of fr. 71,105, of which fr. 65,937 goes to cover the loss of last year. *Péronnes* (in the same district) with a capital of fr. 400,000, made a net profit of fr. 1,355. *Helchin* (share capital fr. 200,000), gained fr. 15,497. *Fleurns* (Hennegan), with a paid-up capital of fr. 223,000, closes with a debit balance (from former years) of fr. 49,638. *Ville-sur-Haine* (in the same district), with a share capital of fr. 238,000, shows a profit of fr. 35,700. *La Ruche* at Gand, with a paid-up capital of fr. 900,000, shows a gain of fr. 110,968, after writing off fr. 30,000.

If we may judge by the present price of the shares, the "London Produce Clearing House Limited" is not increasing in public favour. The paid up share of £2 10s., which stood at the beginning of July at £4 15s. is now down to £3.

On the other hand, the shares of the "Electric Sugar Refining Company," New York, we are informed, are rapidly rising.

The *Deutsche Zucker Industrie* lately contained a rather detailed report of an improved application of the diffusion system at Mironowka, in Russia. Of late the tendency has been to multiply the diffusers, until 12 and even 14 of these have been used, with the idea of thoroughly exhausting the sugar in the material operated upon. Mr. L. Szyfer, the author of the article above-mentioned, states that the improvement consists in dividing the 12 diffuser battery into two batteries of 6 diffusers each, and gives a full description of the working, by which he asserts that much greater economy and efficiency have been attained than with the 12 diffusers worked on the old system. It seems open to doubt whether the results obtained by the divided battery and the special mode of working cannot be equalled or even surpassed by some of the highly improved systems now in use in France, Germany, and Austria. Mr. Heinhold, of the Wallintz Factory (Germany), however, confirms to some extent the statements of Mr. Szyfer, having worked on the same system during two campaigns, and claims priority of use. We shall probably hear more of the matter, as a patent has been applied for.

The following is a comparative statement of Mauritius sugar crops for 1884-85, 1886-87, and 1887-88, from the 1st August, 1885, 1886, and 1887, to the 16th July, 1886, 1887, and 1888, taken from *The Merchants' and Planters' Gazette* (Port Louis). It will be observed that the shipments, as compared with last year, show an increase of 21,515 tons, and with those of the previous one of 8,156 tons.

	Crop 1885-86. Tons.	Crop 1886-87. Tons.	Crop 1887-88. Tons.
United Kingdom	16,311	5,750	12,380
France	10	25	4
Australian Colonies	19,105	17,788	24,246
New Zealand	6,580	4,046	4,745
Bombay	53,054	47,144	57,735
Cape of Good Hope	3,751	2,727	4,655
Natal	8	—	5
Sundry places	13,593	21,592	16,798
	112,412	99,053	120,568

It will be seen from the above that about one half of the Mauritius exports go to India, and one fourth to Australia and New Zealand.

THE SUGAR CONVENTION.

The following letter has been addressed to Lord Salisbury by the Sugar Refiners' Committee:—

21, Mincing Lane,
20th August, 1888.

The Most Hon. The Marquis of Salisbury, K.G., &c., &c.

My Lord,—From what we gather in foreign newspapers it appears probable that France will prove a considerable hindrance to the conclusion of the convention for the abolition of sugar bounties.

It is proposed, as we understand, to bring about a general agreement by prohibiting the importation of bounty-fed sugar; but this policy is criticised in certain quarters as tending to raise the price of sugar.

We desire to point out to your Lordship that no such effect could possibly be produced. The visible annual production of the world is about five million tons, the whole of which is free to enter British markets. The quantity imported by this country from France during the first seven months of 1888 was 24,000 tons. It is therefore evident that if French sugar were excluded from our markets it could not in any way affect the value of the remainder of the five million tons which we should still be free to import. In fact, in order to raise the price of sugar in British markets it would be necessary to raise the price of the whole of the world's production. The exclusion of bounty-fed sugar could not have this effect, both for the reason already given and also because the sugar would simply be diverted to other markets, and have the same effect on the price of the world as it has now.

Moreover, it rests entirely with France herself to say whether her sugar shall enjoy the same treatment as that accorded to the rest of the world. As soon as she ceases to give a bounty her sugar will be free to enter British markets.

On the other hand, so long as bounties continue the interest of the consumer is being ignored, because the bounty-fed competition undoubtedly hinders the progress of production under natural conditions, and therefore tends to place the sugar market on an artificial and uncertain basis. The experience of the last few years has clearly proved this, since we have several times had a rise of fifty per cent.

in the price of sugar, owing to a deficient beetroot crop, showing that the consumer has become too dependent on the bounty-fed beetroot production, which has hindered the natural growth of cane sugar.

It is therefore clear, not only that the prohibition of French bounty-fed sugar can have no effect on prices, but that the abolition of all bounties would restore confidence to producers, and thus secure to the consumer a permanent supply from all quarters of the globe.

We trust that, with so strong a case as this, Her Majesty's Government will not be deterred by the ignorant outcry of a few opponents from taking a course which can alone secure free trade in sugar for the future. We have a constitutional right to claim freedom of competition in our own country, and this we cannot have so long as foreign producers are allowed to be protected on British markets by means of a bounty paid by their own Government.

It is not likely that the working classes will patiently submit to this form of foreign protected competition, and we venture to point out that their opposition, in the event of the failure of negotiations, would be far more formidable than the unsound criticisms of those who, in their desire to pose as freetraders, are really defending the worst form of protection.

I am, my Lord,
Your obedient servant,
George Martineau,
Hon. Sec. British Sugar Refiners' Committee.

FRENCH VIEW OF SUGAR STATISTICS, MORE ESPECIALLY AS THEY RELATE TO GREAT BRITAIN.

The *Journal des Fabricants de Sucre*, apropos of the publication in the *Bulletin de Statistique* of official figures relative to the sugar production of the world, takes occasion to make some comparisons and remarks which are interesting and instructive. We therefore append a *resumé* of the article, without committing ourselves to the exact accuracy of the figures, which however agree tolerably well with those in our possession.

Taking a period of fifteen years, Mr. B. Dureau contrasts the positions of various sugar-producing countries in 1872 and 1886. In the former year the total production of the world was 2,934,080 tons, viz.:—

Beetroot sugar	1,142,896 tons, or 39%.
Cane sugar..	1,791,184 tons, or 61%.

In 1886 the total production was 4,840,081 tons, viz.:—

Beetroot sugar	2,137,351 tons, or 44%.
Cane sugar..	2,702,850 tons, or 56%.

The increase in quantity of beetroot sugar being somewhat below that of cane sugar, Mr. Dureau thinks that this is a proof that the latter can hold its own, though he admits that 1886 is scarcely a representative year, the normal production of beetroot sugar being 2,500,000 tons. He thinks that the probability is that the two sorts will continue for the future in about the same relative proportions as regards production, but warns the growers of beetroot that cane sugar is not a rival which they can afford to despise, as many countries, notably the Dutch East Indies, Barbadoes, and Brazil are making great progress; and although production is stationary in some places, in scarcely any is it on the decline, and he points out that even in the British possessions, which are crying out so loudly against premiums on European sugar, and say they are suffering from the competition of the beetroot, there has been no decrease in production. It is true that the British possessions no longer send to the market of the United Kingdom the same quantities as formerly. On the other hand, the imports from the Dutch East Indies have largely increased, but on the whole, the import of foreign cane sugar into England has diminished, being 284,784 tons in 1887, against 339,217 tons in 1872. The deductions from these figures being especially interesting at the present moment, we give Mr. Dureau's remarks *verbatim*.

"Beetroot sugar has taken in the English market the place of these foreign cane sugars, and also of those of the British possessions, displaced by a competition which has steadily increased, and to which England hopes to put an end by the proposed abolition of the system of premiums. The effect of this competition, which is styled unfair by the partisans of the Convention, is shown by the imports of European sugars, which have risen from 99,549 tons in 1872 to 468,571 tons in 1887, an unwelcome phenomenon which justifies the fears of England, and explains her attitude. To these considerable imports of raw sugar from Germany, Belgium, France, and the

Netherlands, must be added the refined sugars coming from the same countries, and also from the United States and Russia, the total of which was in 1887 315,815 tons, against 87,372 tons in 1872.

"The bringing in of this large quantity of refined sugar into the market of the United Kingdom has not, however, prevented the refining industry from being very active, so large is the consumption in that country. Thus the quantity of sugar turned out by the English refineries, which was 571,667 tons in 1872, reached 743,204 tons in 1887. This is certainly a very good figure, exceeding what has ever been attained by the French refineries, but it might have been increased by nearly the entire quantity of imported refined sugars. The extinction of several old-established London refineries, swept away by the rising wave of refined sugars of every kind imported from the Continent and from the United States, shows that the British refiners, who at any rate had a fine time from 1881 to 1883, are really suffering. In the latter year especially the refineries of the United Kingdom produced no less than 887,882 tons. Liberally supplied with the bounty-fed raw sugars of Austria, Belgium, and Germany, the British refiners had then no thought of complaining of a system of premiums so highly favourable to their being served with the raw material at a cheap rate. The complaints only commenced when the import of foreign refined sugars began to affect them, and those who had so kindly supplied them with bounty-fed raw sugars became their competitors. Hence the agitation of the workmen, and the outcry in favour of home labour, which have found in Baron de Worms, the President of the International Conference, who omits no occasion of defending the interests of the British industries, a most zealous seconder."

Mr. Dureau proceeds to point out that the increase in the production of sugar between 1872 and 1886 amounted to 65%, and it may be admitted that the consumption has increased in the same proportion, which is likely to continue, and to which at present no limit can be assigned. But he thinks that it may be concluded, from the fact that cane sugar, without any of the encouragements enjoyed, thanks to the economic policy of European Governments, by beetroot sugar, has not fallen off, but developed rapidly, in spite of the crisis passed through, that the former possesses natural advantages far above the beetroot sugar, and if the latter should be deprived of protection through the abandonment of the fiscal systems which have so strongly contributed to its prosperity, it will have a severe competition to meet. "It is cane sugar alone which will profit by the projected Convention, which, if it should become a fact, will ensure the predominance of the cane, and decisively turn in its favour the scale which has hitherto been fairly balanced. England, with her colonial connections, her universal commerce, her abundant capital, will, if France does not take care, reap the fruits of an economic policy, to ensure the triumph of which her diplomacy, the most skilful in Europe, is straining every nerve."

THE LONDON TRADES' COUNCIL AND SIR THOMAS FARRER ON SUGAR BOUNTIES.

The following is a copy of a circular recently issued by the London Trades Council in answer to Sir Thomas Farrer's leaflet on Sugar Bounties :—

Sir Thomas Farrar, Bart., has issued, through the Cobden Club, a leaflet on "Sugar Bounties," containing some choice sentences, which show the real aim of such pretended free traders who masquerade in the name of Cobden but violate the first principles of his doctrine.

"Bounties," says Sir Thomas, in his opening remarks,—

"Are bad things. They interfere with the natural course of trade, and rob certain industries in order to nurse others."

That is, bounties are contrary to, and violate the principles of free trade, and rob certain industries, which is the most pernicious form of protection.

Yet Sir Thomas Farrar would maintain them because, as he says —

"Bounties do us a great deal of good, and they do it at the cost of the foreigner. Foreign governments, when they give bounties on sugar, make their own taxpayers—*i.e.*, their own capitalists and workpeople—pay their sugar makers for selling sugar cheap to English people."

That is to say, foreign governments connive with their sugar makers to rob the foreign taxpayers, workmen included, under the pretence of selling sugar cheap to the British consumers. Sir Thomas Farrar, therefore, asks English workpeople to rejoice in sharing the plunder of the wages of foreign workmen—who are much poorer than themselves—when, by international congresses, the toilers of the world are striving to understand each other better, and mutually advance each others welfare. Sir Thomas will find that his opinion of the industrial population of this country is too mean in believing them capable of gloating over this iniquity any more than they would rejoice at eating the products of the sweating system, of slave labour, or sharing the dishonour of receiving stolen goods.

A Paris journeyman carpenter, writing to us on this subject says:—

"We constantly protest against being made to pay 6½d. per lb. for the commonest sugar, to give cheap sugar, so it is said, to England. This is a monstrosity."

John Stuart Mill on Bounties.

John Stuart Mill, the great apostle of free trade, in his "Principles of Political Economy," Book iii., Chap. xxv., p. 83, regarding bounties, says:—

"If the slaves in the southern states were all emancipated, and their wages rose to the general level of the earnings of free labour, that country might be obliged to erase some of the slave-grown articles from the catalogue of its exports, and would certainly be unable to sell them in foreign markets at the accustomed price. Their cheapness is partly an artificial cheapness, which may be compare to that produced by a bounty on production or exportation, or, in order to emphasise it, considering the means by which it is obtained, an apter comparison would be with the cheapness of stolen goods."

Sir Thomas Farrar, Bart., a Prophet.

Sir Thomas says:—

"If we prohibit bounty-fed sugar, we make sugar dearer to our own people."

This is imagination. Listen to experience and fact. On April 13th, 1888, Messrs. James Keiller and Son, of Dundee,—who are probably the largest jam, marmalade, and confectionery manufacturers in the world—wrote thus to the London *Times*:—

"The abolition of foreign sugar bounties, we consider, would only be an act of justice to our home refiners, while it would prove a national benefit in promoting the industries of our colonies. . . . . . . As to how it would affect the trade we are particularly interested in—that of preserve makers and confectioners—we do not see it would do so injuriously: indeed, we do not think it would ultimately produce a material difference in the price of sugar. . . .

It is not fair to assume that the British consumer gets the benefit of the bounty, seeing the price of bounty-paid sugar is regulated by the ordinary considerations of the market." [See *Times.*]

How have the mighty fallen.

Sir Thomas Farrar says:—

"Let us go farther, and suppose that Germany and France agreed to give us our sugar for nothing. Should we refuse it? Decline a gift to our people amounting to £30,000,000 a year, because we have a refining industry with a capital of only one-tenth ot that sum?" What rubbish! Does anyone in his senses believe that Germany and France will ever dream of giving us all the sugar we consume "free, gratis, for nothing?" When they do, it will be time enough to consider whether we will allow our industries to be destroyed. In the meantime they are only giving our consumers sugar at the same price as other people.

Imagination instead of Argument.

Sir Thomas says:—

"Cheap sugar means the employment of English labour. It means cheap material for the jam and confectionery business."

Nonsense, Sir Thomas! In 1877 the total consumption of sugar in the United Kingdom was 900,000 tons, or a yearly consumption per head of the population of 56½lbs., and the market price was £32 12s. per ton. This price gradually fell till ten years later (1886) it was only £17 per ton, nearly half the price, yet the total consumption with ten years' increase of population was only 1,100,861 tons, or an average of 66½ lbs. per head of the population; that is to say, an increase of 10lbs. per head on the year, or about an additional three ounces per week, which has not given work to one additional person. Where, then, is the enormous increase of employment for English labour by a demand on the sugar trade to compensate for the thousands of workmen thrown idle by the closing of factories all over the kingdom? As to only a few persons being employed as refiners, this this is another palpable illusion. The number of actual refiners may be a comparatively few thousands. But these are as nothing to the allied industries. Stopping the construction and fitting—to say nothing of repairs—of huge factories before production or refining begins means the displacement of many thousands of building operatives, engineers, boiler-makers, blacksmiths, pattern makers, charcoal burners, artificial manure manufacturers, barge builders, watermen and lightermen, coal miners, carriers, and general labourers, as well as destroying the purchasing power of more than half-a-million of workers in British possessions. Your spurious doctrine, Sir Thomas, is not likely to delude the thoughtful working men of the United Kingdom.

Wealthy England's Shame.

Sir Thomas Farrer places his country in a dishonourable light before the world. He says:—

"Cheap sugar means a cheap comfort to all our people. It means that every householder in the country gets good sugar at less than half the price paid for it in the countries where it is made. Let foreign nations take care of themselves. When they in their folly offer us a free gift, do not let us be such fools as to refuse it."

Just so, Sir Thomas, get all articles you want at a low price, no matter how. Never mind what wrong, injustice, robbery, misery, destitution are inflicted on others so long as you get cheaply your own articles of consumption by a process, for instance, which you say—

"Interferes with the natural course of trade, and robs certain industries to nurse others."

The British Board of Trade, early in 1888, issued an official report on the conditions of labour, with the budgets of income and expenditure of a large number of workmen's families in Belgium. This report shows that scarcely a home ever indulges in the luxury of sugar, so essential, according to Sir Thomas Farrer, for the comfort of the working classes of England. Only in a few cases does any item for sugar appear at all, and, then only to the amount of a few pence per week. Why? Because, unable to help themselves, they are robbed through their Government—

"To pay their sugar makers for selling sugar cheap to English people, at less than one-half the price paid for it in the countries where it is made."

State Bounties Stop Universal Free Trade.

Richard Cobden's noble ideal was "Universal Free Trade," but Sir Thomas Farrer and the "Cobden Club" know that until State bounties are abolished this grand hope can never be realised. Are they striving to prevent its consummation?

The "Cobden Club" an Outrage on Cobden.

Misled by Sir Thomas Farrer, Bart., the Cobden Club has floundered into a position of antagonism to Free Trade. It is an outrage on Richard Cobden to put his name forward in support of a system of aggressive Foreign Protection when we have abolished our own Protection.

This self-constituted, self-named "Cobden Club" has for its motto.—"Free Trade,—Peace,—Goodwill among Nations,"—yet distributes the writings of Sir Thomas Farrer, wherein he likens foreigners to fools, and is not ashamed to invite England to take advantage of their folly. Is this principle or pocket? Let Sir Thomas Farrer and his class coterie pursue this selfish and ignoble device—nicknamed Free Trade; the workmen are actuated by a higher code of international morals.

Cobden's Free Trade.

Richard Cobden, speaking of Free Trade in corn, July, 1844, said:—

"We do not seek Free Trade in corn primarily for the purpose of purchasing it at a cheaper money rate, we require it at the natural price of the world's market; whether it becomes dearer with a Free Trade, or whether it is cheaper, it matters not to us, provided that the people of this country have it at its natural price, and every source of supply is freely opened, as nature and nature's God intended it to be."

This is the only Free Trade—because it is sound and honest, both in practice and theory—which the working people of Great Britain are likely to uphold.

Our Prosperity and Free Trade Endangered.

England's greatness consists of her manufacturing power. Destroy this, as Sir Thomas Farrer, Bart., suggests, by accepting the bribe of foreign protection, and England must eventually be ruined.

At present the great mass of our industrial population are genuine. consistent, and determined Free Traders on the principles propounded by Richard Cobden. The only peril to that feeling will be the apostate traders who cant the name of Cobden, yet maintain, when suiting their personal interests, the vilest system of foreign protection, which would not be tolerated for one hour if proposed by our own Government, and the opposite of any real principle of national economy.

London Trades' Council Executive.

(Signed)—

T. Abrey, Carpenters & Joiners' Soc.
B. Cooper, Cigar Makers' Society.
E. Coulson, Bricklayers' Society.
J. Davis, Philanthropic Coopers' Soc.
C. Drummond, Compositors' Society.
C. Freak, Boot Rivetters' Society.
J. Pye, Gold Beaters' Society.
T. Smyth, Metrop. Plasterers' Soc.
W. Steadman, Barge Builders' Soc.

GEORGE SHIPTON, Amalgamated Decorators' Society, *Secretary.*

THE SORGHUM INDUSTRY.

By Santiago Dod.

(Continued from page 413, August Number.)

So much for what history teaches. Let us now inquire what practice proves?

An immense number of central beet and cane factories which have been in successful operation throughout the world, having overcome many years ago all the impediments cited by Mr. Clement, which shows that if they have not succeeded as yet in Kansas, it is only because the industry is too young to have acquired the necessary experience. In fact, the whole course of this new industry seems to show the need of that general technical knowledge and practice in sugar making, which is equally applicable whatever kind of raw material is used, and the initiators would undoubtedly have been saved much trouble, and the manufacture been much further advanced if they had had at hand for consultation a real sugar expert (not precisely a chemist, but an industrial engineer), thoroughly versed in all the branches and operations of all kinds of sugar making. Without the aid of the experience gained in other countries, they must necessarily waste much time trying what has already failed and been condemned, and discovering what is already known.

As regards the acquisition of an adequate quality of raw material, we see that the German factories have not only accomplished it but have at the same time educated the beet up to the point of yielding 12½ per cent. average instead of 7 or 8 per cent., some going far beyond this. The directors of the factories fix the rules of cultivation and furnish all the seed and manures employed. Why should not sorghum factories eventually do the same with equal success? How can they expect to succeed without doing it?

In the island of Cuba, even in a factory which makes thirty-three million pounds of sugar yearly, no difficulty is experienced either in getting cane brought regularly to the mills or in suspending the supply when necessary. All this is specified in the agreements. The conditions are so universally known that any one who plants cane for sale, virtually accepts them before he puts the seed in the ground, and the price he will receive is all that remains to be determined.

Central factories in that island are, with very few exceptions, connected to the railways by switches, sometimes five or six miles in length and large cars will be seen coming in upon one side of the yard loaded with cane, brought thirty, forty and even sixty miles. On the other hand, narrow gauge locomotives will be met bringing in trains from the roads belonging to the factory, (I have ridden upon one of these nine miles in a straight line). Other trains drawn by mules will be brought in from the portable tracts. Large ox-carts carrying loads of from 7,500 to 10,000 pounds will come crowding up to the cane carriers after being weighed, but there is no confusion, doubt, or conflict. All know what is expected, recognize the necessity for the conditions imposed, and the thing is done. Why should not the same efficiency and order be attained in Kansas, as soon as experience has developed a proper knowledge of what is required?

The sorghum industry is yet in its infancy, and is at present upon too small a scale to be secure or highly profitable. All manufactures must in this age be conducted on a large scale to be able to stand competition. You cannot run a broad guage industry upon a narrow guage track, and small factories at home cannot long compete with large ones abroad. If the production of sorghum sugar ever reaches a safe development, the factories will count their product in tons and not in pounds. They will be connected with railroads and receive cane like any other freight, besides having roads of their own. Their locomotives will leave the factory with trains of empty cars, dropping along the road a designated number to each farmer, and all who detain them beyond the regulation time will be fined. The same locomotive will return picking up the loaded cars, and taking them back to the factory. Trains will also be brought from the public railroads, so that the factory will always have a stock of raw material on wheels, which can be brought to the mill whenever needed during the night or the day, and their will consequently be no interruption of the work. There is no obstacle in the way of all this, except the want of capital and of practice.

The fact cited by Mr. Clement, that Louisiana has no central factories, is no argument whatever against the practicability of the system in Kansas, and is simply a new evidence of the paucity of knowledge upon this question in the United States, for it is well known that the producers of this State are lamentably behind the age, and where there is not a single "sugar house" which can compare favourably with the best models of any other country, it is hardly to be expected that there should be any example of the newest and most perfect system of production. There are no central factories in Louisiana, simply because a high protective tariff has enabled the planter to maintain the obsolete slavery begotten plan. Nevertheless, they must soon abandon it, or the production of sugar altogether, and turn their attention to the simpler feat of raising cabbages. The advantages of central factories are so thoroughly proven, that they do not appear to be questioned anywhere out of Louisiana and Kansas, as all the energies of sugar production elsewhere are directed to establishing them. I agree with the statement that a factory should own a tract of land, and not be erected in a town. If the industry ever reaches economical proportions, the factories will be so large that they will become towns in themselves as they are in Cuba and other countries. The advantage to a factory of controlling all its surroundings is so evident, that this form has been adopted, more or less, in all kinds of manufacturing upon a large scale in all parts of the civilized world. That it will be safest in the present incipient state of the sorghum industry, for each factory to possess a large tract of land is also undeniable, because owning the greater part of the soil where its raw material is grown, gives it a better control of its crop and makes it more independent; but it does not follow as a necessary consequence that it would be best to cultivate it all upon its own account. Experience has shown in tropical countries that better results upon the whole are obtained by giving the greater part to tenant farmers. In the majority of the large Cuban factories a combination of the three different methods has been brought about through natural causes. The factory raises cane upon a part of the land (more to be able to find work for the best hands employed in the sugar house during the manufacturing season,) the rest is divided among tenants bound to cultivate a certain extent in cane, and funds are furnished them to begin the work. The raw material is purchased besides from independent farmers in the vicinity or along the lines of railroad. Cane is already bought and sold in Cuba almost as wheat is in the United States, and anyone within reach of a factory plants it, confident that there will be no trouble in obtaining its value. When the manufacture of sorghum sugar reaches this stage, the cane will be analyzed before it is bought and will only cost what it is worth.

That cane can be more cheaply raised upon a large scale under a single direction is also true, provided the labourer is not paid upon the Louisiana system (of punishing the good labourer and rewarding the bad, by paying all the same wages), but upon the plan adopted in other cane-producing countries, of paying each for the work he has accomplished when it has been properly executed, and providing also the cultivation is put under an entirely separate management, for it is very difficult to find united in one man the vast amount of knowledge and the aptitude necessary to bring both branches of production to perfection, even if he had the time at his disposal to do it. A great many persons suppose they possess these conditions, but experience has shown the world over that such men are just about as common as cows with six legs.

The plan of tenant farming is preferred in Cuba for several reasons. It surrounds the factory with an honest working class, who are interested in it, and defend its interests, besides furnishing it with a good class of labour for the working of the sugar house; but above all because from the manner in which the price of cane is adjusted it divides the losses in bad years, and the risks from fires, which constitute the greatest danger to the crop. Every load of cane brought is weighed and a deduction made if too much of the top is left on, or too much trash loaded with it. A receipt is given, and at the end of the week or month payment is made either in money or sugar. If the factory extracts, for instance, 9 per cent. of sugar, freest product, 4½ per cent. is given for the cane. If in cash the average of the quoted value of sugar in the Havanna market during the time of delivery is taken, and the equivalent of 4½ per cent. of the total weight of cane is delivered in a money order. In case of fire, all the tenants concentrate to extinguish it, and as many as are needed to cut and haul the burnt cane before it spoils. This service is afterwards paid in money or in kind. The stipulations are not rigorously enforced on either side, where there are just grounds for consideration, and there is no difficulty in carrying out these arrangements, because necessity has smothered blind egotism, and all those interested fully comprehend that for the success of the enterprise each must concede and accept what is requisite for the common good. This is a lesson which must be learned by all who wish to succeed in the modern system of sugar manufacture.

There is underlying all that has been stated a still more potent argument in favour of the central system—a question of grave economical polity. That the small farmer is the backbone of a nation, is a fact too well recognized to admit dispute. He is likewise and for similar reasons, the only guarantee for the stability of a great sugar industry. Let us suppose that the principal portion of the lands of Kansas should become covered by large sorghum factories, producing their own cane. The whole policy of the State would become subservient to this overwhelming interest, and the labourers, finding no other means of defence, would resort to "strikes" at the commencement of each campaign. The enhancement of the cost of production from their impositions would be greater than from a division of the profits with tenant farmers. The factories would have nothing to bind the labouring class upon which they depended, and would be constantly menaced with ruin by having it drawn off elsewhere. The only safe rule is "to live and let live," and any enterprise which attempts absorbing all the profits, will eventually come to grief just as the plantation did.

Large central factories should be located upon lines of railway, but not necessarily upon running streams of water. Few in Cuba depend upon anything but a common well for this supply. All the exhaust steam should be utilized on the concentration of the juice, and the water of condensation returned hot to the boilers. There is besides, a constant supply of water from the plant itself, if the chips are milled to use as fuel. The evaporation from the juice, in a properly constructed apparatus, will supply pure distilled water for the battery, and that used for the condensers of the vacuum pans should be cooled upon a refrigerating tower by the action of the atmosphere (and worked over and over again until it becomes too impure to be longer retained) as the condensed vapour from the syrup and juice will make up the loss by insensible evaporation upon the cooler.

If this new industry is to advance rapidly, it must avail itself largely of foreign experience, looking upon the one hand to Germany, because hers is a manufacture which has also grown up in a free country uncontaminated by slavery, and under true economical industrial influences. Upon the other hand, it should imitate in a measure, the practices of some of the best modes in tropical countries, because their raw material is more analogous. They should in Kansas, however, beware of copying Louisiana practices, unless their utility is confirmed by adoption elsewhere, because her producers are still trammeled by old-time habits and prejudices, and are behind the rest of the world in everything but the mere mechanics of cultivation. In this particular they have been obliged to advance, from the fact that cane is here an exotic, but in the application of labour saving implements, the Kansas farmer is ahead of the planter, who still employs much hand labour in working his fields. I have seen nothing, as yet, in which the Louisiana producer approaches perfection nearly enough to be imitated. On the contrary, the sorghum industry once put upon a solid basis, will leave sugar production here far behind, because its initiators are free from prejudice, and have no old customs to which they have become wedded.

One of the first things in which they will have to imitate Germany is in the cultivation of their plant to a higher sacchariferous value, or at least a more stable one. For this it will be necessary for them to raise their own seed, and experiment in cultivation to discover the most adequate system of fertilization. Without this it is doubtful whether the industry will ever extend enough to assume a position of national importance. They must copy the island of Cuba in the size of their factories, and in the manner of supplying and transporting their raw material. They must utilize the residue of the cane as fuel to save the labour and to avoid an encumbrance. A pressure not exceeding two pounds to the square inch should be used in the coils of the granulating vacuum pan, as with the best of cane syrups a loss of 8 per cent. of sugar is caused by employing boiler pressure, and with the more impure sorghum syrups the sacrifice will be much greater.

Although it is not always safe to judge without practical experience in this particular phase of sugar manufacture, there is probably another error committed in the systems employed in Kansas, for I see that some advocate restricting the industry to making syrups, whilst others favour the production of sugar. It is probable that, as generally happens where there is a marked divergence of opinion in such matters, both are half right, and that the best course would be a combination of both methods, granulating the syrups from cane of good quality, and simply boiling it down to nearly the consistency of molasses when the ratio of glucose is large, and running the product into tanks to crystalize; drawing off the supernascent liquid when nearly cold to sell as syrup, and melting the sugar remaining in the bottom of the tank with clarified juice to the consistency of semi-syrup, to be afterwards granulated in the vacuum pan in the usual way.

Much more might be said upon the general questions of sugar production in Kansas, but I hope what has been stated will be sufficient to convince the author of the article which has given rise to this lengthy epistle, that the obstacles met with in the efforts to establish the central system of manufacture in Kansas, are simply due to the youth of the industry, and that in time they will all disappear through the enterprise and perseverance of those who have already done so much for its advancement.

DIFFUSION PRACTICALLY CONSIDERED.

By Santiago Dod.

(*Continued from page 431.*)

Many attempts have been made to utilize mill bagasse in

The Manufacture of Paper

by converting it into "stock," or directly into the finished product upon or near the plantation producing it. In the first process the same obstacle is encountered which hampers its use either as fuel or manure, and in the case of diffusion chips milling would be necessary to expel a part of the water, and desication to complete the work in order to save freight and loss by decomposition. The fuel and labour employed would probably cost more than the product is worth. The second method has been tested by that enterprising capitalist, Mr. Hogg, on one of his Demerara plantations, at an expense of over $100,000, but was a failure, and the "plant" is offered for sale. Were any economical means discovered for converting the chips into paper, it would be after all but a partial solution of the problem, for notwithstanding the innumerable uses to which this material is put, and the immense quantities consumed, if all the bagasse yearly produced throughout the world were employed for the manufacture of paper, the market would be flooded and its value depreciated below the cost of production.

The manner then of disposing of the chips is not optional, and they must inevitably, under the present conditions of the industry, be burnt as fuel and replaced in the field by the ashes and the cow pea.

This point settled, the first questions raised are in regard to the best means for obtaining their highest caloric effect, and the amount of evaporation which may be effected by their use.

The first step to be taken is in the reduction of the moisture from 90 to 50%, as any fuel containing more than this proportion of water, cannot, or at least has not as yet ever been burnt to advantage. This cannot be economically effected by hydraulic pressure as has been proposed, and if the plan were feasable it would be better to apply it at once to the extraction of the juice, and not "bother" with diffusion at all. This method was tried and proved a failure long ago.

The Mill must therefore be retained,

but perhaps in a simpler form, as two rolls will probably be sufficient for this end, if that as yet too little appreciated improvement, the hydraulic regulator is used. If these do not effect all that is required, *four* rolls will be needed, in order to avoid the necessity of a turn plate, which even with highly disintegrated bagasse is very objectionable, and would be much more so with chips. The continued use of the mill does not necessarily imply a notably increased consumption of steam, as the exhaust would be needed for the concentration of the juice.

The necessity of milling the chips adds yet another question to the long complex series related to diffusion, which claim a practical test. Will it be advisable to return the water yielded by the rolls with the remnant of sugar it contained to the battery again? Not to the diffusor about to be emptied of its charge, for that would gradually increase the sugar retained in the residue, but to the second or third vessel, or whichever contained liquor of a corresponding density. If this should prove advantageous, the water, as the juice comes hot from the batter, should pass through the juice heater, or else the water used from the battery should, in order to economize steam.

The heater referred to is of course one worked by the vapour from the last pan of the triple, or rather the quadruble effect, and not by exhaust steam as has been done in Louisiana, ignoring completely the real intent of this improvement. If the use indicated for the water extracted from the chips is feasible, the dilution of the juice might be greatly reduced by drawing much smaller charges from the battery, so as to leave 5 or 10% of sugar in the residue according to circumstances, for half of this amount would be recuperated from the rolls.

The partial drying of the chips in the mill has been tried in Demerara, with great promise of success, and is perhaps being now practised there, as arrangements had been made to commence the campaign at *Nonpareil*, with diffusion and the residue as fuel. It will not, however, be amiss to enter more fully upon this subject, as it is nearly allied to the burning of green bagasse.

It is to be presumed that a hurried disintegrated material like the exhausted chips after passing through the mill may be utilized as fuel, from the fact that damp saw-dust which resembles it in so many respects, has been successfully used for a long time. To form any adequate conception as to the most beneficial means for its combustion, it is necessary to make deductions from the results obtained in different parts of the world in burning all sorts of damp material, but to enter upon a detailed review of all that has been accomplished sifting step by step the bad from the good, would demand a separate treatise upon this important subject. The most that can be attempted here is a bare statement of what appears to be clearly indicated by general experience up to the present time.

Besides drying the chips as much as possible between the rolls, the following seems to be the main requisites for attaining a maximum result in the generation of steam by their use. All the air supplied to the furnace must be heated sufficiently to produce upon contact with the fuel an almost instantaneous evaporation of the moisture, an operation attended with little additional expense beyond the increased cost of construction, because the heat imparted to the air is again transmitted to the boiler. A very large heating, in proportion to the grate surface, probably about double that generally given. A separate furnace for each generator, and a damper between each boiler and the chimney in order to graduate the draught to its most adequate effect, the absence of which in Louisiana practice, is one of its most prominent defects. The use of the step or ladder grate, which seems to be the only appropriate one for highly disintegrated fuels, or at least that which has given apparently the most positive results wherever tried. If possible, a natural and not a forced draught, and finally, a large volume of air rather than a very rapid current, or in other words, a chimney with a large flue and moderate height.

The great defect in many of the green bagasse furnaces in Louisiana, is the great loss of heat in the chimney or smoke stack, due in a great measure apparently to the mistaken conception, that because a small number of units of heat are required to expand a large volume of air, the loss from this cause is trifling. This would be true if the air stagnated in the chimney, instead of constantly carrying away the heat by a rapid current. The Mississipi river needs comparatively little water to keep it at the normal level when there is no flow, but running at the rate of six miles an hour, it requires the drainage of half a continent.

Having determined as far as possible what may be considered requisite to a maximum result in burning the residue, let us now endeavour to ascertain the

Value of Chips as Fuel

for the general purposes of manufacture. Not by theoretical calculation, but by the same system thus far pursued, of making deductions from what may be considered as well established facts in common industrial practice.

In the Island of Cuba it is not an uncommon occurrence for central factories having improved but still imperfect apparatus and boilers, to be troubled with a surplus of bagasse, notwithstanding the carelessness in its use, which a superabundence always induces. The Algorta estate might be cited as a case in point and one where there is no good reason to suppose the existence of a great excess of ligneous matter, and where the density of the juice will probably not average over 9½° B. At the time referred to the defective condition of the manufacture was further aggravated by not using the heater, and taking the juice cold to the defacators instead of having it heated to 170° F. by the lost vapour from the triple effect, a defect which implied a large loss of heat.

We know from the testimony of credible witnesses, that in the Sandwich Islands, where the economy of concentration is far behind that of the German factories, the whole manufacture is being effected with green bagasse alone. We may therefore assume that the mill bagasse in a humid state, would, in Louisiana, with proper triple effects and burners, be amply sufficient without the use of coal as an auxiliary for all the operations of the sugar house.

We must now take into account the fact that as from 15 to 20% more sugar is extracted by diffusion, and that saccharine matter may be supposed to be a good fuel, this difference will be equivalent to a reduction of a like amount in the calorific value of the residue obtained. No account is taken of the albumen, as the supposition that it would be retained in the chips by coagulation does not seem to be verified in practice—a result which is probably advantageous in so far as it favours both combustion and the clarification of the juice. This depreciation by loss of sugar can, however, be easily compensated by thoroughly proven means. In the cases cited to show the efficacy of bagasse, the triple-effect apparatus is used for the concentration of the juice, but European experience shows most conclusively, that by substituting the quadruple-effect, there is for every pound of coal burnt, an increase of evaporation of from 28 to 30%, so that by the adoption of this improvement, the loss of fuel by increased extraction would be annulled, leaving still a surplus of from 13 to 15%, which would in all probability cover the consumption of steam for the battery and cutters.

What remains now to be ascertained is the possible minimum of added water in the process of diffusion, and the cost of fuel requisite for its evaporation.

The first item has not yet been practically determined, but we may reasonably presume that, with a properly constructed battery judiciously worked without aspiring to a total extraction, but economical results—at most thirty pounds of water would be needed for every hundred pounds of chips, or 600 to the short ton of cane. In the German factories fifteen pounds of water, at least, are evaporated per pound of coal, so that but forty pounds of auxiliary fuel would be required per ton of cane worked. Putting then the price of a barrel of coal, including first cost, carriage to the furnaces, stoking and removal of the ashes at 50 cents, the adoption of diffusion with all the best appliances known for the manufacture of sugar, would simply mean an additional cost of about fifteen cents to the ton of coal, if the chips can be economically used as fuel. This might be further reduced to about one half if there is no exaggeration in what is claimed for crude petroleum or pulverized coal for fuel.

There is still another problem left unsolved by the Magnolia experiments, in regard to the supply of pure water, but there appears to be no objection to obtaining this from the cane itself. Taking for granted that the water of condensation from the first pan of the quadruple-effect will be immediately returned to the steam generators, that furnished by the other pans would supply the diffusors. In several Cuban factories this water has been used for "feeding" the steam generators, and one factory at least claims to have used it almost exclusively for this purpose during many years. This would seem to settle another practical question of considerable moment.

One important experiment made at the Magnolia has not yet been noticed—that of returning the skimmings to the battery. If this can be satisfactorily done, it will result in a very considerable saving of labour and juice, and will be a new argument in favour of diffusion. Unfortunately, the test made was too short to be considered conclusive. That the chips in the diffusors act as a filtering medium upon solid matters, seems to be pretty well substantiated, but whether the result would be the same in respect to soluble impurities like those received from the juice, is more open to doubt. Never to return to the juice any impurity once separated, is a ruling principle in sugar making, and it is to be feared that the restitution of the skimmings would, if sufficiently prolonged, result in a constant aggregation in the juice of deleterious matters, which would in the end lead to a greater loss of sugar in the molasses than the amount sacrificed by the present method.

We have, after considering the main features of this intricate subject, now reached the vital question, whether the Louisiana producer, with so wide a margin in his favour between the cost of fuel and the value of sugar in his own market, can immediately adopt this new and more scientific process for the extraction of sugar. The answer must unfortunately be, with a very few exceptional cases, most decidedly in the negative; and this inability is due to one great defect which has characterized his course from generation to generation, and to one which for the public good, attention should be most forcibly called, if the industry upon which the future prosperity of the whole population of the State principally depends, is ever to emerge from the swaddling clothes in which it has so far passed its rickety and unpromising existence.

From the mere fact of pertaining to a nation famed for its love of progress and mechanical ability, Louisiana having once initiated the manufacture of sugar, would naturally be expected to lead the world in perfecting its operations, and that she now be found so eminently deficient is one of the greatest industrial anomalies of the age, and surely a discredit to the majority of her producers. With the exception of a few bright examples worthy of all praise for having dared to exist in such a stiffling atmosphere of predjudice and retrogression, the sugar planters of Louisiana have unfortunately been characterized from generation to generation, by an imperturbable opposition to all innovation. They have as a general rule, whilst systematically rejecting all important inventions offered them at home as perseveringly ignored those which menaced their industrial existence from abroad, until the accumulation of unadopted improvements that have for years been heaping up around them as a barrier to their own prosperity and success, has become such as to make the task of raising their manufacture to the level of their rivals, a herculian one indeed. Having neglected to avail themselves of each new devise at the time of its adoption by the rest of the world, they are now debarred the advantages of diffusion which is the latest of all, and one that demands all the most perfect concomitant appliances that the science of the world has been able to produce.

Had the planters, as a body, been more enterprising instead of accepting all changes long after date and under protest, that natural progression which has marked the course of other countries, would also have fulfilled its mission here, and in each locality some one of a leading mind by adopting each successive improvement that presented itself would have perfected and extended his operations to a stage which permitted paying for his neighbour's cane more than they could obtain from it themselves, and the surrounding planters would have gradually been brought to recognize the immense advantages of the new system, and to aid in lieu of opposing its development. By the same easy transformation which has advanced sugar manufacture throughout the rest of the world, large perfected central factories would have arisen to supercede the obsolescent plantation, capable of competing with their foreign adversaries, without quaking through fear nor begging for favours. The large profits of such establishments would have drawn millions of capital from all parts of the Union, and the high price they would have paid for cane, would have brought hundreds of thousands of the best farming class from other States, to cultivate the raw material; and these factories, instead of lying idle the greater part of the year, would have been kept in constant operation refining imported foreign sugars, raising Louisiana to the position of the greatest sugar centre of the globe. All her desert wastes would be rendering rich harvests and her chief city would have become the second metropolis of America.

The people of Louisiana can scarcely afford to await a tardy deliverance from their present languishing financial condition at the hands of an inefficient and obsolete system of production and to achieve that prosperity which the great natural advantages they possess, fully authorize them to expect and demand that which was not done at the proper time in the natural course of industrial progression, must evidently now be accomplished by the energetic adoption of the most modern methods with an entirely different organization from the very commencement of this new departure. What the self constituted directors of their principal industry have not done for them during nearly a century of probation, they must apparently now do for themselves, creating large manufacturing centres upon the same economic and industrial principles whose efficiency has been proved in the German models. Not *plantations* in any sense of the term (for these are things of the past, and at best but a perverted system of manufacture which had its origin in a still more perverted form of human labour), but veritably sugar factories founded by stock companies, and controlled by a body of directors elected from hundreds of members on account of their special aptitude for the task, whose united wisdom may be relied upon to avoid the errors of the old system committed under the guidance of a single owner, often totally unfit for the work. The co-operative plan which has shown the best results elsewhere, should be as far as possible adopted, and the cane raised upon the tenant system by immigrants from the Northern States, in order to proportionately increase the supply of labour, without which any great augmentation in production would be impossible.

That Louisiana possesses all the essential requisites and can and should become a vast field for the rapid development of a great sugar industry upon a more modern and adequate basis, is a fact which has been long recognized. Where then so many circumstances combine to favour this movement, that it has not yet been initiated, can only be ascribed to some very potent adverse influence, which it behoves all interested in the future prosperity of the State to discover and remove.

Casting aside old time prejudices and retrogressive habits of thought, there will perhaps be little difficulty in finding the real secret of the non-success of all the efforts heretofore made to obtain pecuniary aid from abroad for this purpose. The course adopted by extremists, who, as a rule, endanger every cause they advocate, seems to be at least a very unwise one for the interest in whose defence they claim to act. In any case, it is but too obvious, that the false conceptions unceasingly disseminated throughout the length and breadth of the

Union, respecting the State of Louisiana as a sugar producing country, can not have have had a very favourable effect upon her progress. The value of her great industrial resources for this purpose, have been daily and hourly assailed by the use of a very considerable amount of sophistry, to prove that the sugar industry (which will probably always be her main source of prosperity) has no secure basis nor strength for natural and independent development—that its very existence is a precarious one, maintained solely by adventitious aid, and in fact, that it is an abortion which can never survive adverse fiscal legislation.

This mania policy, or whatever it may be, of belittling the advantages of Louisiana for supplying a great national want, has been persisted in until the majority of those who would sympathise with and be willing to aid a rising industry which promised in time to be self-sustaining, seems at last to have become duly convinced that sugar production in this State is something of a farce, or a rotten enterprise devoid of all the inherent elements of stability and success—maintained for the exclusive benefit of a privileged few, and unworthy of the sacrifices made for its sustenance.

The advisability of destroying public confidence in the industry of the future by discrediting the capacity of the State for sugar production, in the vain endeavour to save the antiquated system of "plantations" which has been sentenced long ago to extinction by the practical experience of the rest of the world, is not very evident, and seems at best but a suicidal course as far as general interests are concerned, and all the more so that there seems to be no necessity for such extreme grounds.

Taking into consideration all the peculiar circumstances of the case, it would appear to be wiser and more prudent to rest all claims in favour of the present abnormal condition of the local production upon the simple fact that the present is a most inauspicious time for any considerable reduction in the sugar duties, in as much as it would jeopardise the infant industries of California, Florida and Kansas, besides retarding the reformation of that already established in Louisiana, which absolutely needs a respite for improvement.

To be constantly proclaiming to the world the impossibility of producing sugar in Louisiana without the aid of a high protective tariff, thereby destroying all public confidence in the stability and possibilities of the manufacture, besides frightening away the capital and immigration the State so much needs to develope her great resources, deprives many planters of the means for that rapid improvement which is their only salvation. It is to be supposed that the sterling good sense of the majority of the American people may safely be trusted to leave no industry entirely unprotected if its vigour and enterprise merits public consideration unless animosity be provoked against it by an arbitrary resistance to necessary fiscal changes.

There is sufficient evidence in published data, approved by the Planters' Association, to show beyond all doubt that large perfected central sugar factories in Louisiana would require no protection, and that on the contrary, they would offer one of the most remunerative legitimate investments the United States can present. Such being the case, what the "planting" interest really requires is not *indefinite* protection, but that public confidence which brings cheap capital, and the necessary time to extend and reform its manufacture. These will evidently be obtained only by a frank exposition of the truth, and not by belying its own capabilities. Let those who still reject improvement meet their well deserved fate as best they may. The sooner they go where "old fogies" cease from troubling, and ineptitude is at rest the better for all concerned, whether it be out of the industry or out of the world.

DESCRIPTION OF DIFFUSION PLANTS, SYSTEM SANGERHAUSEN, FOR SUGAR-CANE FACTORIES.

For the following detailed description of the Sangerhauser diffusion system as relating to sugar cane, we are indebted to the well-known makers of diffusion plants, The Sangerhauser Actien-Machinenfabrik und Eisengiesserei (late Hornung & Rabe), Sangerhausen, Germany:—

The great interest taken by all interested parties in the very important question of diffusion, as applied to sugar cane, induces us to submit to cane sugar manufacturers, plans and description of our diffusion machinery, in order to give any such information as may appear desirable, with regard to its capacity and to the results to be expected from working the same as compared with mill work.

Cane Cutter.

The diffusion-cells or diffuseurs of our diffusion batteries are either arranged in a circle or in one or two lines. The cane cutter or slicing machine is always placed on the ground floor, outside the factories buildings, under a suitable light-built shed. This cane-cutter is of the horizontal type, Patent Actien-Maschinenfabrik Sangerhausen. It has in its cutting disc twelve knives, fastened to strong knife-holders, which are securely held in their position by centrifugal force only. This construction permits all the knives to be taken out and new ones inserted in about five minutes.

The cutter is guaranteed for a capacity of 250 tons of cane in 24 hours. Three sets of knife holders and ten sets of good well-tempered grooved steel knives are furnished with each cutter. There is no necessity for having a duplicate cutter for the above-mentioned work to be done—all that is necessary is to have one set of knife-holders, with the knives fastened to them, ready to hand as a reserve, in case of the knives in the machine getting dull.

From what we have been able to learn so far, from the working of our cane cutters in cane sugar factories in various parts of the world, we now may state, that the knives can be used advantageously from 12 to 24 hours before they require re-sharpening, whatever the quality of the cane. The re-sharpening is done on an emery grindstone, driven from the main shaft of the machinery. The knives travel quite automatically up and down on a support in front of the emery wheel, so that they must become strictly parallel.

The feed-hoppers of the cutter, six in number, are placed at an angle of 45 degrees. The cane is fed from the top, resting on a roller on the upper edge of the hopper, which facilitates its progress to the knives. The canes are fed to the knives by the force of gravity alone, and as they fall endways at the mentioned angle against the rapidly revolving disc, the knives shave or plane off the ends of the cane.

Each hopper is attended to by one man, and these six men are, without being compelled to work very hard, well able to feed 250 tons a day to the cutter. This has been fully demonstrated at Plantation *Nonpariel*, Demerera, where one of our largest size batteries has been at work for some time, and we beg to mention besides, that the labourers in Demerara are most East Indian coolies, and far from being physically very strong.

The cutter ought to be driven from below if possible in any way. In cases where this cannot be done, the driving shaft of the cutter is made so long that the belt coming from above is not in the way of the attendants.

The cutter is placed in a pit, and only the upper part, viz., the cover of the cutting disc with the feed hoppers projects over the surface of the ground. In the case of Demerara, where the cane is shipped to the factory in large iron punts, containing about three tons, we had to build a large concrete tank for the cutters right in the mill dock. The cutters are firmly bolted against the bottom of the tank, and the latter being covered, forms at the same time the platform on which the attendants of the cutters stand while they are feeding the hoppers. The cane punts lie alongside the tank all round the same. It may be seen from this arrangement, which answers its purpose very well, that swampy soil as foundation ground, which is often to be found in sugar cane districts, does not at all interfere with the putting up of our cutters in the manner above proposed.

TRANSPORT OF CANE-SLICES TO THE DIFFUSION CELLS.

The cane slices produced by our grooved knives are very well cut up, thereby offering a large surface for diffusion to the liquid in the diffusion cells. They are conveyed to the diffusion-house by an inclined elevator, "Stotz's Patent." The rakes or buckets of this elevator are fastened to two endless chains, composed of tempered malleable iron chain links. These links are connected to each other in such a way, without special connecting bolts, so that they can easily be taken to pieces and connected again.

FILLING OF THE DIFFUSION CELLS WITH CANE SLICES.

With our circular difiusion batteries we fill the cells cane slices by means of a swinging chute, which is suspended from the elevator hopper, and which can be turned to each cell as required. This arrangement permits of a very easy filling of the cells; however, it is impracticable for factories, where the raw material—the cane—cannot be weighed, and where this has consequently to be done with the cane slicers.

With batteries in one or two lines we have two methods of conveying the cane slices to the diffusion cells—either by means of a second carrier, Stotz's Patent (See Fig. 3), placed horizontally above the diffusers, or by trucks running on rails around the whole battery. The first of these two methods is to be preferred on account of its simplicity and its entirely automatical working, whilst the transport of the slices to the diffusers in trucks requires much manual labour, and considerable attention on the part of the workpeople. We recommend this latter method only in such cases, where weighing of the cane before being sliced is impracticable, and where the cane slices have to be weighed.

In the case of a horizontal slices carrier and a double-lined battery we arrange for small suspended swinging feed-chutes, by means of which each cell is filled with slices from the carrier as required—one chute always serving for two opposite cells. We strongly recommend to fill the cells in this latter manner, as it is the cheapest and most convenient in every respect.

Description of the Diffusion Cells.

The diffusion cells, fourteen in number, are cylindrical; they are made of the best boiler plates, except the top and bottom pieces, which are heavy castings. The discharge gates at the bottom of the cells have the same area as a horizontal section of the cells themselves. A counter-weight attached to these gates renders their manipulation very easy. As the door is opened the weight of the chips throws it down, and the whole mass drops out with the greatest ease. As soon as the cells are discharged the counter-weight tends to close the doors again. Thus one man, or even a boy, can easily open and close the gates. The closing of the discharge gate is effected in our diffuseurs by the hydraulic rubber tube. This device is as simple as it is effective, and by its use a perfectly tight joint is secured without any care on the part of the operator. It is only necessary that the pressure of the water within the tube be slightly greater than that of the liquid within the cell. This is secured by attaching the rubber-tube to a small water tank about a yard above the one which supplies the cells.

Juice Heaters.

The liquid, in passing from one cell to the next, is heated in the juice heaters, one of which is attached to each cell. These heaters are so constructed that they may be easily opened and closed, if cleaning or examining of the same should prove necessary, and that the brass heating tubes may freely expand.

Compressed Air Apparatus.

Our diffusion batteries are provided with an apparatus by means of which the last charge of liquid from the cell next to be opened is removed by means of compressed air, which method succeeds most admirably, preventing at the same time both loss of sugar and waste of water. The machinery by which this admirable result is accomplished is not complicated. A small air compressor is driven by a belt from the main shaft of the machinery. A very small expenditure of power is required to keep this compressor in motion. The compressed air is received into a closed tank, from whence it is conveyed by iron pipes to the diffusion cells.

Water required for the Diffusion Process.

The quantity of water required for working a diffusion battery, that is to say, the water which is actually used in the cells for diffusion, and for cleaning the cells after their being emptied, amounts to about 120 per cent. on the weight of the cane to be diffused; it will, however be increased to 200 per cent., if the compressed air apparatus should not be used in connection with the battery.

The water must enter the diffusion cells under a pressure of 15 to 22 pounds per square inch, which can be effected by taking the water from a tank, which is placed 32 to 48 feet higher than the top of the diffusors. In cases where a high water tank cannot be provided the water can be taken directly from the main water-pipe, which is to have a safety valve for this purpose, loaded to the required pressure; however, it will in this case be necessary to provide an ample air vessel for the water pump in order to prevent shocking in the diffusion battery.

Impurities, mechanically suspended in the water, do not interfere with the diffusion process, whereas a water which has large quantities of salts, &c., in solution is not fit for this purpose. Water containing more than one half gramm of soluble matter in one thousand gramms of its own weight should not be used for the diffusion process. The cane slices in the cells form an excellent filter for unclean water, such that it is not at all necessary to filter the same before use.

Exhausted Cane Slices as Fuel.

Our diffusion batteries are so arranged that the exhausted or spent cane slices, after being discharged from the cells, may be shovelled into a screw conveyor, placed underneath the battery, which carries them to an elevator leading to the mill, in case they shall be used as fuel.

It has been proved at Plantation *Nonpareil*, Demerara, that in passing through an ordinary three-roller cane mill a sufficient degree of dryness is obtained to enable the slices to be burnt direct in a suitable furnace, whereby the very important question of using the slices as fuel is fully settled. They are of course not as valuable for fuel as the megass resulting from the cane mill, the difference in value being just the difference in the amount of sugar left in. The power required for drying the cane slices in the mill is very little; at Plantation *Nonpareil* it was only necessary to give the engine valve a slight touch in order to admit sufficient steam to run the mill.

At Plantation *Nonpareil* we carry the dried slices, containing from 45 to 50 per cent. moisture, to the boiler furnaces by means of a Patent Stotz's carrier. These furnaces are of an entirely new construction, and of our own design. Two of them were first put up as a trial, and two more were ordered at once, when it was found that their construction left nothing to be desired for the purpose for which they were intended. These four furnaces are now used for raising steam in the same number of boilers of about 860 square feet heating surface each, and they consume all the exhausted slices resulting from 400 tons of cane per day of 24 hours.

Exhausted Cane Slices for Fertilizing the Land.

Dr. H. W. Wiley, Chief Chemist of the United States Department of Agriculture, who conducted the various diffusion experiments at Fort Scott, Kansas, and at Plantation *Magnolia*, Louisiana, in which latter place he used one of our circular diffusion batteries with cutter, is firmly convinced that the exhausted slices are far more valuable for fertilizing the land than megass in any form as for fuel, The slices would not only furnish organic matter to the soil, and thus increase its porosity, but they also contain still a considerable part of nitrogenous matter, which would afford a valuable plant food. Even the richest land should be treated fairly, and the cane field should receive as nearly as possible as much as it gives. Replacing the exhausted slices on the field is a matter which should receive the greatest attention; however, this is a question the solution of which depends entirely on local conditions, cost of fuel, &c.

For the purpose of carrying the slices to the field we propose to run a cart right under the diffusion cells, and discharge into the same instead of using carriers and elevators.

Capacity of our Diffusion Batteries.

With regard to the capacity of our diffusion batteries we beg to say that we have not found it to be advisable to have a battery larger than for 300 tons of cane per day of 24 working hours. For a larger day's work we recommend to take two or more batteries, arranged in line, one alongside of the other.

DILUTION OF DIFFUSION JUICE.

The dilution of the diffusion juice with water, or in other words the percentage of increase over normal juice by the additional weight of water by diffusion amounts to about 30 to 35 per cent. of its own weight.

EXTRACTION OF JUICE FROM THE CANE BY THE DIFFUSION PROCESS.

The exhausted cane slices contain from 0·2 to 0·5 of one per cent. of sugar. This means an actual extraction of 98·41 to 96 per cent. of the total quantity of juice in the cane; or of 88·57 to 86·4 per cent. of normal or original juice from the cane, taking the whole quantity of juice contained in the cane as 90, and fibre, &c., as 10, and assuming that the original cane juice contains 14 per cent. of sugar.

Taking the average extraction of ordinary three-roller mills as 60 per cent., and that of double mills at 68 per cent. on the weight of the cane, while supposing the extraction by diffusion to be only 86·6 per cent., this extraction would mean 44·16 per cent. increase over ordinary mill, and 27·20 per cent. over double mill returns.

POWER REQUIRED FOR DRIVING THE DIFFUSION MACHINERY.

The power required for driving the diffusion machinery, viz., the cutters, elevators, and carriers, amounts to one-seventh to one-fifth of the power required for driving a double mill.

CONSUMPTION OF COAL WITH THE DIFFUSION PROCESS.

With regard to the total quantity of fuel consumed with the diffusion process, we take the liberty of reproducing Dr. H. W. Wiley's remarks on this subject, which we take from the Bulletin No. 17 of the United States Department of Agriculture, as follows:—With the best apparatus, most economically arranged, the total consumption of coal per 100 lbs. of cane would be:—

	Lbs.
For a double effect	15·02
For a triple effect..................................	12·33
For a quadruple effect............................	10·88

Reduced to 1,000 lbs. of sugar from cane, yielding an average of 10 per cent. of all sugars, the figures become:—

For 1,000 pounds sugar—	Lbs.
With double effect	1,502
With triple effect	1,233
With quadruple effect	1,088

In all these calculations the coal is assumed to be of fair average quality, and to be able to convert six pounds of water into steam at usual boiler pressure for each one pound of coal. In general, then, it may be said the quantity of coal required to make 1,000 pounds of sugar by diffusion varies from 1,000 to 1,500 pounds, according to the system of evaporation employed.

Diffusion can only be made an economical success when the best machinery and the most economical methods are employed. The great objection which has been urged against it, viz., the increased consumption of fuel required, is entirely removed when the process is carried on under the economical conditions which have been mentioned. To attempt to introduce diffusion with old and worn out apparatus, defective boilers and open pans, would simply be disastrous. It can only succeed when the highest mechanical skill, associated with the best scientific control, directs all the operations of the sugar house.

CHARACTER OF THE DIFFUSION JUICE.

The diffusion juice is perfectly clear, no floculent matter being mixed up with the same. It is as different from the cloudy green mill juice as anything can be. As mentioned before, the slices in the diffusion cells form a very effective filter for the liquid passing through the same. The albuminoids of the cane juice, which coagulate already at 149 degrees Fahr., become insoluble by the high temperature in the cells, and are, therefore, together with the bulk of the mucilaginous matter, in passing through the slices, mechanically separated from the juice.

DEFECATION AND EVAPORATION OF THE DIFFUSION JUICE.

The diffusion juice is defecated with lime in the ordinary way, very little skimming being necessary. Evaporating and boiling of the juice to *masse cuite* has to be done in the usual manner.

ADVANTAGES OF THE DIFFUSION PROCESS.

The advantages of the diffusion process are apparent :—

1. It increases the yield of sugar from the cane considerably. From 27 to 44 per cent. more juice is obtained than by best mill crushing.

2. The diffusion juice is of better quality than mill juice, thereby permitting a better clarification and increasing the yield of dry sugar from the juice.

3. The danger of breaking the mills is entirely avoided. Diffusion machinery is as simple as anything can be, and it can easily be repaired on the plantation, if something gets out of order.

4. No heavy expensive foundations required, thereby lessening the cost of erection.

5. The cost of production of the sugar is reduced by the higher yield.

We have furnished diffusion batteries for sugar cane to the following countries:—Demerara (British Guiana), Hawaiian Islands, Australia, and Louisiana.

With inquiries for estimates we should like to have the following information:—

1. How many English tons of sugar cane shall be diffused per day of 24 working hours?

2. In which manner is the cane transported to the factory?

3. Shall the diffusion cells be arranged in a circle, in one line or in two lines? For batteries in line please state whether the cells shall be filled by means of a Stotz's patent carrier or by slices trucks.

4. Shall the exhausted cane slices be used as fuel or for fertilizing the land? In case of their being used as fuel please state how many feet of Stotz's patent carrier are required to convey them to the mill. If they shall not be used as fuel please state whether a screw carrier underneath the battery shall be supplied or not.

5. Shall a water pump and high water tank for the diffusion water be supplied, and how many feet, approximately, of cast iron water pipes, up to the tank and down from there to the battery?

6. Shall the air compressing apparatus for discharging the diffusion cells be provided or not?

7. Shall a measuring tank be supplied with the battery, to measure the juice to be drawn from the battery, before it goes to the defecators?

8. Shall a steam engine for driving elevators, cutters, &c., be supplied?

9. Shall an iron staging for the diffusion cells be provided, or shall the cells be placed on woodwork.

POSTSCRIPT.

We have just received a record of the first season's work with the diffusion battery erected by us for Mr. John Robb, Melbourne, at his Plantation Cudgen, Tweed River, N. S. W., Australia.

Mr. Robb had requested two sugar experts, Messrs. Dr. G. Kottmann and A. Hamilton, of the Colonial Sugar Refining Co., Sidney, to examine his diffusion apparatus, and to give a detailed account of the results obtained with the same.

We take the liberty of reproducing the following passages of this report.

Mr. Hamilton says in his letter to Mr. Robb, dated Condong Mill, 18th February, 1888 :—

CANE CUTTER.

We made several trials to see what the knives could really do under favourable circumstances, and found that with straight cane and with good steady feeding they were quite able to cut 12 tons an hour.

STOTZ'S PATENT ELEVATOR.

The slice elevator is a most reliable one, and instead of the chips being carried up by buckets, which I understand is the usual way, they are taken up by means of iron pins, fitted tightly into an endless chain. During the time that I was at Cudgen we had not a single stoppage which could be put down to this elevator, which, I think, speaks in its favour.

EXHAUSTION OF CANE SLICES.

I am sending you the particulars of an experiment made by Mr. Kottman, made on 4th February, 1888, by which you can see that he was able to exhaust the chips to 0·51 per cent. cane sugar. (See Mr. Hamilton's analyses on pages 495 and 496).

QUALITY OF DIFFUSION JUICE.

The juice flowing from the diffusion is very clear, and when taken into a test-glass hardly any impurities can be seen. When boiled in the clarifiers only a very little scum rises to the top, not a twelfth part of what we obtain from the crushing juice at Condong Mill.

EXHAUSTED SLICES AS FUEL.

There is one set of very small rollers at this mill, which is going to be used next season for crushing the exhausted slices, and the manager is under the impression that they will burn readily after being crushed.

QUALITY OF THE SUGARS OBTAINED BY THE DIFFUSION PROCESS.

I am sending complete analyses of the first and second sugars for four and three weeks respectively. I may add, that the first sugars are fine hard-grained grey samples, containing from 98 to 99 per cent. of sugar cane. The syrup from this sugar is jellied, and after being allowed to remain in the tanks about four days is again fugalled, and the sugar obtained is marked as second. The syrup from this is boiled smooth again, and after lying in the tanks for a few weeks is again cured, and the molasses from it mixed with the food given to the horses.

OTHER REMARKS.

The manager has told me on several occasions that he is thoroughly satisfied with this plant. During the time that I was engaged at this mill there were no breakages of machinery connected with the diffusion plant, and it appeared to work simply and smoothly.

Mr. Hamilton continues in saying that the manager had told him that he is now manufacturing a ton of sugar from half the number of tons of cane which it formerly took with his old system of rollers. This shows that the diffusion process at Cudgen gave entire satisfaction. We may, however, mention that it is of course self-understood that such extremely good results by diffusion could only be obtained in a factory where the crushing machinery was very imperfect.

Dr. G. Kottmann remarks upon the foregoing are as follows:—

Attached is a sheet showing the chief data reported by Mr. Hamilton. The figures given speak for themselves, and not much need be added.

During my stay at Cudgen on the 4th February, a trial has been made with the view of reducing the sugar in the exhausted slices and of testing the different knives. It is seen from Mr. Hamilton's report on this trial that the sugar was greatly reduced, and it should be said that this was done with comparatively quick work.

RESULTS OBTAINED BY THE DIFFUSION PROCESS AT PLANTATION CUDGEN WHEN WORKED BY DR. KOTMANN, 4TH FEBRUARY, 1888.

(The analyses was made by Mr. A Hamilton.)

CANE ANALYSES.

Brix. Per cent.	Cane Sugar. Per cent.	Fruit Sugar (Glucose) Per cent.	Quotient of Purity.
Lost	12·13	0·95	—
16·82	13·36	0·67	79

AVERAGE.			
16·82	12·75	0·81	79

DIFFUSION JUICE.

Brix. Per cent.	Cane Sugar. Per cent.	Fruit Sugar (Glucose) Per cent.	Quotient of Purity.
12·2	9·9	0·74	80
12·5	10·6	—	85
12·6	10·65	—	86
AVERAGE.			
12·43	10·38	0·74	84

EXPRESSED WATER FROM EXHAUSTED SLICES.

Brix. Per Cent.	Cane Sugar. Per Cent.	Quotient of Purity.
0·5	0·4	80
0·5	0·4	80
0·5	0·43	86
0·8	0·43	80
0·9	0·76	84
0·8	0·6	75
0·4	0·53	83
AVERAGE.		
0·63	0·51	81

Sangerhausen, (Germany), 15th June, 1888.

DIFFICULTIES IN FILTERING SKIMMINGS RESULTING FROM THE CLARIFICATION OF BEET SUGAR SOLUTIONS.

Herzfeld made several experiments to discover the reason why skimmings filter sometimes only with the greatest difficulties. His experiments in this respect are not yet finished; however, he has succeeded in so far he has discovered in the skimmings a substance, soluble in alcohol, which swells, even in small portions, with water to a voluminous jelly, which latter could not be filtered at all, and proved to be "Cholestrine."

ffusion-Battery for ugar Cane

system

Sangerhäuser Actien-Maschinenfabrik u. Eisengiesserei.

Sangerhausen. Germany.

Fig. 3.

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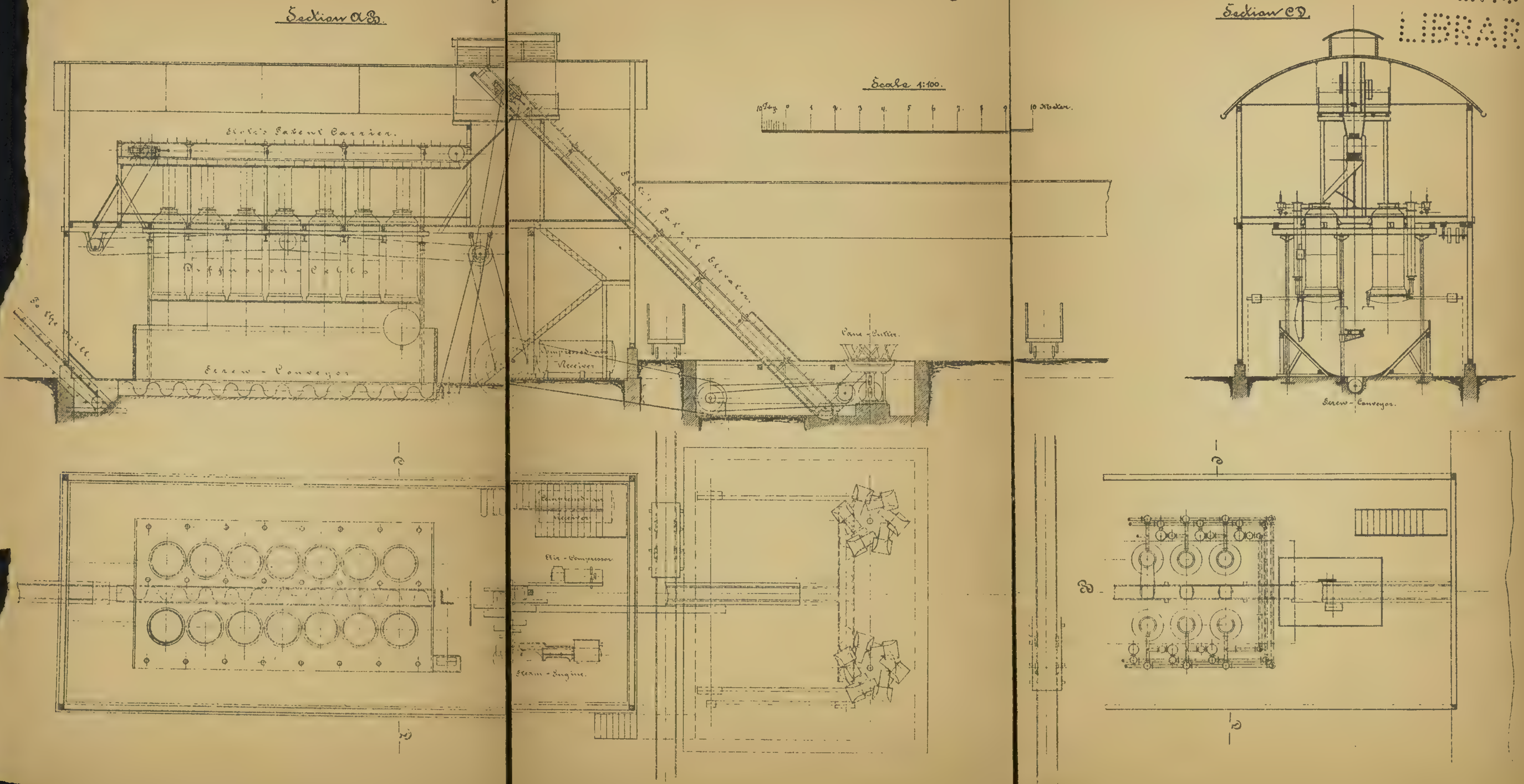

BRAZIL AS A FIELD FOR EMIGRATION.

The Belgian Minister at Rio de Janeiro, in a recent report to his Government, makes the following remarks on the subject of Brazil as a field for emigration:—

"It is into the province of St. Paul that the immigration of Europeans should be encouraged. For three years a daily increasing number of foreign labourers, mostly Italians, has been pouring into this province.

"St. Paul, which is situated to the south of the Empire, and bordered by the provinces of Rio, of Minas-Geroes, of Matto-Grosso, and of Parana, has an area of 312,283 square kilometres. Its population is computed at 1,400,000 only, the latter including nearly 200,000 foreigners, mostly Italians, when, in proportion to the countries of Europe, it could easily support more than 30 millions. In the north-west region, vast territories occupied by the Indians are not yet explored.

"The climate is generally very healthy. The thermometer averages 19° Centigrade (66° Fah.). The temperature is higher on the littoral, where, in the summer season, it rises to 25° and 30°, and even higher. The sanitary conditions are therefore not quite so favourable. Yellow fever sometimes makes its appearance, but in the endemic state. This malady has considerably abated in Brazil, where it no longer exists except in a few seaports.

"The Brazilian yellow fever, of which people make a bugbear in Europe, is less to be feared than the cholera or typhus epidemics. It is limited to within a few zones of the coast, and never shows itself at a greater distance than 15 leagues from the sea. Most of the cases are due, moreover, to the imprudence of the victims, who neglect the precautions recommended to ward off its attacks.

"After the passage of the Serro do Mar, at an altitude of 850 metres above the level of the sea, the climate of the province of St. Paul may be cited as one of the best in the world, equal and even superior to that of central France. The soil is of astonishing fertility, and in the temperate zone produces in surprising abundance most European products. By reason of the immense extent of its territory, no country offers a vaster field of activity for the labour of man. The numerous streams contain a motive power which only requires to be utilised to the profit of industry. The climatic and other conditions render its soil suitable for every description of cultivation.

"The capital of the province is the town of St. Paul (San Paulo), situated in 33·33 degrees south latitude and 49 degrees west longitude. Its population numbers 50,000, of whom 22,000 are foreigners: 12,000 Italians, 6,000 Portuguese, 2,000 Germans, the remainder of various other nationalities, French, Spaniards, Belgians, the latter to the proportion of one-fiftieth. It is the central point of the principal railways, and the seat of the presidency of the province and of the episcopate, possesses the first university of the Empire, with 1,000 students, a large seminary, a tribunal, an agency of the public Treasury, manufactories of cotton tissues, ices, spirits, chemical matches, and gloves, a foundry, and even a Belgian bakery.

"The province contains other important towns, such as Santos, Campinas, Jundiahy, Sorocaba, &c.

"The principal language is the Portuguese, but the Italian is also much spoken, as well as the French and Spanish.

"The Roman Catholic is the State religion of Brazil, but there is complete religious liberty.

"There are numerous ways of communication in the province of St. Paul.

"The principal railway lines, with an extent of over 2,000 kilometres, are the following:—

"English, 139 kilometres. St. Paul and Rio de Janeiro, 231 kilometres. Paulista, 242 kilometres. Sorocabana, 200 kilometres. Ituana, 162 kilometres. Dragantina, 52 kilometres. Mogyana, 638 kilometres. Rioclaro and Araraquara, 266 kilometres. St. José do Pardo, 72 kilometres. St. Mauvel, 28 kilometres. Total, 2,030 kilometres.

"In the town of St. Paul there is a society, having at its head M. Martinico de Silva Prado, and disposing of a capital of 500 contos of reis (£46,200) for the transport of European emigrants to the province.

"This society gives a free passage from any European port to Santos as a destination, to every family of emigrants engaging to establish itself in the province of St. Paul, whether for agricultural purposes or not.

"The port of Santos is the place where the emigrants land. They are conveyed, free of cost, to St. Paul by the railway which ascends the Serro do Mar. The train deposits the emigrants at an immense hotel established for the service of emigration. This place, where an admirable organisation exists, can hold more than 1,000 persons. New comers are lodged there free of cost for eight days whilst waiting offers of engagement, which are seldom wanting. It is rarely that, within three days, all the families of emigrants are not established, for after their arrival offers are made to them on all sides by the numerous owners requiring workmen. Hiring contracts no longer exist. There is a simple verbal engagement, the cancelling of which on one side or the other is optional at all times. Emigrants have the choice between colonies created by the Government and private undertakings.

"At first they can, if they have the means, purchase a house and 25 acres of land for the sum of £50 ready money, or for £60 with four years' credit. They can cultivate the usual crops, and also work on account of the Government for a few hours during the day at the wages of 1,000 reis (about 2s.) per day. But there is no obligation to do so.

"The three large colonial centres under the direction of the Provincial Government are those of Cannas, Cascalho, and Ribeiraô Preto.

"Other colonies, not so large, but equally good, exist at Gloria, at St. Bernardo, at St. Caetano, at St. Anna, and at Lorena; these are divided into lots, of which several are now vacant.

"Whatever may be the advantages offered by large colonial centres, it is desirable that, at the beginning of his settlement in Brazil, the emigrant should offer his services to a land proprietor, whether he does or does not possess the funds sufficient for the acquisition of pieces of ground. The reason for this is as follows:—Newly landed in an unknown country he has to acquire an education. He must acclimatise himself, must learn the language commonly spoken, make himself acquainted with numerous details respecting the various methods of cultivation, which differ from those in Europe, and finally must not exhaust in *experiments* the money which he will require later.

"Employed in large private plantations, he immediately earns a wage which allows him to provide for the means of existence for himself and family. He acquires the knowledge which he lacked, and can, without hurrying, seek the situation best suited to him, for he can leave at a day's notice the farm where he is provisionally engaged.

"In the *fazendas* a family consisting of several persons, husband, wife, and children above 10 years, that is to say fit for work, earns sufficient to pay for maintenance and food, and effect savings. In these *fazendas* a substantial dwelling-house is granted gratuitously to the settler, which he can manage as he likes, together with about one acre of land, where he cultivates vegetables and cereals. Additional land may be obtained at an annual rental of 7·50 francs per 4,000 square metres (about 6s. per acre).

"A healthy and active man can easily cultivate 4,000 feet of coffee, the woman 2,000, in addition to attending to her household duties. The elderly people and children furnish an amount of work in proportion to their age and their powers. Thus there can be seen in the *fazendas* families of Italians, consisting of 15, 18, and even 22 persons, the grandparents, husbands, wives, children all working together happily and contentedly.

"The months of May, June, July, August, and September, harvest-time, require the settler to work every day in the coffee plantations. The remainder of the year leaves him sufficient leisure to look after his own crops, which largely provide his food, and from which he can also reap considerable profits.

"The average of the day's work does not exceed eight hours. The settler has the option of choosing the hours of the day best suited to him for the work he wishes to do. Each family has its house separate, can have a yard and keep pigs, goats, and cows when means are forthcoming to purchase them.

"To the emigrant without resources, the planter or *fazendeiro* supplies during the first year the things necessary for his subsistence, haricot beans, manioc flour, rice, lard, meat, salt, and sugar, and even tobacco and spirits. But this is only an advance, which must be repaid out of future gains. It rarely happens that the settler has not grown at the expiration of a year the wherewithal to keep himself.

"The following statement shows the average earnings of emigrants, established on the basis of last year's returns:—

Husband and wife, old, 1,000 francs (£40).
,, ,, young, 1,300 francs (£52).
Two robust single men, 1,500 francs (£60).

A man and three children, 1,600 francs (£64).
Husband, wife, and child, 1,600 francs (£64).
Four labourers, of whom two women, 2,000 francs (£80).
Five ,, ,, three ,, 2,800 francs (£112).
Three men, 2,540 francs (£101 12s).

"An economical family can easily maintain itself at a cost less than the wages it receives.

"If the emigrant possessing a little capital wishes to settle on his own account, he has plenty of suitable lands to choose from. It is difficult to fix exactly the prices of these lands. The margin is very great. The minimum is 12·50 francs per 2 hectares 42 acres (1s. 8d. per acre), and rises progressively to 1,000 (£6 13s. 4d.) and 1,500 francs (£10) and above, the value of the lands varying according to their situation and the kind of cultivation it is proposed to carry on.'

"The foregoing information especially relates to immigration for agricultural industry. If in the interior, in the country, the agricultural labourers are sought after to such a degree that in a few days 30,000 emigrants, consisting of families, can easily find work; others will also find employment in the towns, where there is almost always a demand for good cooks, domestic servants, and artisans.

"The liberal professions, or those of the scientific, commercial, or artistic order, are not referred to. For these the conditions are most exacting, the chances of success without guarantee, the competition by the native element being very keen. They concern an entirely different order of things. It is a question here only of the emigrant properly so-called.

"The wages offered in the towns are high compared with those in European or American countries, including the Argentine Republic.

"The following statement gives some idea of these. In the province of St. Paul a day labourer is paid from 75 francs (£3) to 100 francs (£4) per month, with board and lodging.

Kitchen-gardener, from 100 francs (£4) to 150 francs (£6), with board and lodging.

Gardener, from 125 francs (£5), to 200 francs (£8), with board and lodging.

Baker, from 125 francs (£5) to 250 francs (£10), with board and lodging.

Cabman, from 100 francs (£4) to 150 francs (£6), with board and lodging.

Cook (man or female), from 100 francs (£4) to 150 francs (£6), with board and lodging.

Domestic servant, from 75 francs (£3) to 125 francs (£5), with board and lodging.

Servant, from 65 francs (£2 12s.) to 100 francs (£4), with board and lodging.

Nurse, from 100 francs (£4) to 125 francs (£5), with board and lodging.

Seamstress, from 75 francs (£3) to 100 francs (£4), with board and lodging.

Carpenter, from 7·50 francs (6s.) to 12·50 francs (10s.) per day, without food or lodging.

Shoemaker, same as carpenter.

Mason, from 6·25 francs (5s.) to 12·50 francs (10s.) per day, without board or lodging.

Stonemason, from 10·00 francs (8s.) to 15·00 francs (12s.), without board or lodging.

Smith, from 5·00 francs (4s.) to 15·00 francs (12s.), without board or lodging.

Saddler and harness-maker, 7·50 francs (6s.) to 10·00 francs (8s.), without board or lodging.

Machinist, from 1,250 francs (£50) to 3,000 francs (£120) per annum. The difference in wage is fixed according to merit.

"The price of articles of food varies, but not to a very great extent, according to the situation and the abundance of crops.

"The average price of some of these articles may be approximately stated as follows:—

Sugar, 0·82 francs per kilogramme (3½d. per lb.).
Lard, 1·18 francs per kilog. (5¼d. per lb.).
Coffee, 0·66 francs per kilog. (3d. per lb.).
Rice, 0·25 francs per litre (1½d. per pint).
Potatoes, 0·25 francs per litre (1½d. per pint).
Manioc flour, 0·12 francs per litre (¾d. per pint).
Millet flour, 0·16 francs per litre (1d. per pint).
Maize flour, 0·10 francs per litre (½d. per pint).
Haricots, 0·25 francs per litre (1½d. per pint).
Tobacco, 2·50 francs per kilog. (11d. per lb.).

Meat, 1·25 francs per kilog. (5½d. per lb.).
Charcoal, 25·00 francs per 100 kilos. (10s. 2d. per cwt.).
Duck, 1·25 francs (1s.) each.
Fowl, 1·25 francs (1s.) each.
Sucking pig, 7·50 francs (6s.) each.
Goat, 7·50 francs (6s.) each.
Sheep, 10·00 francs (8s.) each.

THE PANAMA CANAL.

The *Statist* of 18th August puts the actual financial position of this concern very clearly before the public, and makes it very plain that the Bourses have before long to face the inevitable smash of the Company, and with it the total ruin of many hundreds of thousands. The sanguine temperament of M. Ferdinand de Lesseps seems to make him lose his judgment when he is deeply interested in any scheme, and his last public declaration to the shareholders, at the general meeting on August 1st, surpasses all his previous excursions into the regions of prophecy.

When the Parliamentary Committee was sitting in May last to investigate whether the exceptional privileges of a lottery loan might be granted to the Panama Company, it was elicited from the leading engineers of the work that the final execution of the Canal was impossible with the amount then asked for—viz., 600,000,000f., but that they hoped to advance the operations with this money so far that the feasibility of the waterway could be demonstrated to the world. Meanwhile, the Lottery Loan was decidedly a failure, and the public took only 830,000 of the 2,000,000 bonds offered, as was officially admitted when application was made for a quotation on the Bourse of Paris. M. de Lesseps acknowledged, at the recent meeting, that many of the last Lottery Bonds had been paid up in full, under discount, and that this would enable them to continue their work. At the same time he asked all those present to exert themselves to place the remaining 1,170,000 Lottery Bonds. The pressing financial needs of the Canal would thus be provided for, and the "miserable speculators" defied.

M. de Lesseps carefully avoided mentioning that hitherto his estimates about the time of opening the Canal have invariably proved erroneous, and that his promises, solemnly repeated whenever he applied to the public for money, were every time unfulfilled. He wittingly kept back from his shareholders the investigations of the Parliamentary Commission of May this year, and yet made bold assertions about the final execution of the Canal, which he knew to be inconsistent with his own declarations and those of his principal officers before the Commission.

After this, it cannot be wondered at that many serious bankers, who hitherto relied upon the veracity of M. de Lesseps, should grow disgusted, and abandon the whole enterprise as hopelessly impracticable. Meanwhile, some of the big Paris establishments have committed themselves very heavily; the Crédit Lyonnais, for instance, has recommended to its numerous clients all and every Panama issue so warmly that its standing and reputation would be decidedly jeopardised by the break up of the Canal Company, which cannot be delayed much longer. Such a smash would not involve a dead loss of capital of fully £55,000,000 sterling, but would cause a run upon some of the big Paris banks for the repayments of deposits—a demand which could not possibly be complied with, seeing how seriously and deeply they have committed themselves to the Panama enterprises. Here lies the great danger for the Paris Bourse, and the prospect of a repetition of the l'Union Générale crash.—*Financial News.*

NEW YORK PRICES FOR SUGAR.

From Willett, Hamlen & Co.'s Report, August 16th, 1888.

Fair Refining.	96o/o Centfs.	Granulated.	Stand. A.	Stock in Four Ports.
Aug. 16, 1888.—5 5-16c.	6¼c.	7½c.	7⅛c.	Jan. 1, 1888— 47,798 tons.
Aug. 18, 1887.—4 9-16c.	5 5-16c.	5⅞ 15-16c.	5 9-16c.	Jan. 1, 1887—102,279 tons.
Aug. 19, 1886.—4 9-16c.	5 3-16c.	6 1-16c.	5 9-16-⅝c.	Jan. 1, 1886— 57,328 tons.
Aug. 20, 1885.—5¼c.	6c.	6 11-16c.	6¼-⅜c.	Jan. 1, 1885— 89,186 tons.
Aug. 14, 1884.—4⅞c.	5 11-16c.	6 9-16c.	6 1-16c.	Jan. 1, 1884— 60,900 tons.
Aug. 16, 1883.—6⅝c.	7 9-16c.	8 11-16c.	8 3-16c.	Jan. 1, 1883— 50,297 tons.
Aug. 17. 1882.—7⅛c.	8c.	9⅛c.	8¾c.	Jan. 1, 1882— 43,927 tons.
Aug. 18, 1881.—7 11-16c.	8½c.	9⅝c.	9¼c.	Jan. 1. 1881— 66,999 tons.
Aug. 12, 1880.—7¾c.	8 17-32c.	10½c.	10⅛-¼c.	Jan. 1, 1880— 63,558 tons.
Aug. 14, 1879.—6⅝c.	7 11-32c.	8 7-16-½c.	8¼c.	Jan. 1, 1879— 50,773 tons.
Aug. 15, 1878.—7 1-16c.	7 29-32c.	9¼c.	8⅞-9c.	Jan. 1, 1878— 48,230 tons.
Aug. 16, 1877.—8½c.	9 1-16c.	10¾c.	10⅜-½c.	Jan. 1, 1877— 25,885 tons.

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. THOMPSON, C.E., F.C.S., M.I.M.E., Patent Agent, 6, Lord Street, Liverpool; 6, Bank Street, Manchester; and 323, High Holborn, London.

ENGLISH.

APPLICATIONS.

8766. A. G. WASS, Kent. *Utilizing the residues from the manufacture of starch, glucose, starch sugar, dextrine, and alcohol.* 15th June, 1888.

8881. W. KLOEN, Birmingham. *Coating tea with sugar either in a plain white state or crystallized.* 18th June, 1888.

9183. G. FLETCHER, London. (Partly communicated by C. A. Matthey, Demerara.) *Improvements in apparatus for use in boiling and evaporating sugar and other liquids.* 23rd June, 1888.

9305. J. W. BAILEY and J. A. R. GREAVES, London. *The manufacture of a new or improved saccharum for the use of brewers, distillers, and vinegar makers (complete specification).* 26th June, 1888.

9775. C. STEPHEN and C. J. LANGEN, of the firm of F. Langen and Hundhausen, London. *An improved process for rapidly refining sugar in loaf form through the combined systematic or simple purification of the loaves with pure liquor within the form under pressure, subsequently driving off the superfluous liquid and regaining the same by means of the centrifugal apparatus, and the apparatus for carrying the process into effect.* (Complete specification.) 5th July, 1888.

9869. W. SMITH, Chorlton-on-Medlock. *Improvements in or relating to treating saccharine, so as to obtain it in a pure crystalline form, and in dissolving saccharine so as to produce a sweet liquid for medicinal purposes.* 7th July, 1888.

9888. D. STEWART, Glasgow. *Improvements in sugar cane mills.* 7th July, 1888.

10216. H. GUGEMHEIM, of the firm of Gugemheim & Grass, London. *Improvements in the manufacture of saccharine liquors for brewing, and other similar purposes, and in the mode of their manufacture.* (Complete specifications.) 13th July, 1888.

ABRIDGMENTS.

10842. L. E. A. PRANGEY, Paris. *Improvements in the manufacture of sugar and in the apparatus to be employed therefor.* 8th August,

1887. This invention has for its object a continuous method of refining, purifying, or bleaching sugar, and consists in arranging the material in a comparatively thin layer between perforated or open surfaces, which cause it to advance with them continuously or intermittently, in order to present it in this form to openings through which are projected the respective purifying or bleaching agents, which then pass in succession through the layer of sugar, under the influence of their pressure, and in addition thereto, when advisable, under the action of a vacuum created on the side of the layer on which the agents are to leave. With this method of purifying sugar, and combined with the moulding machine, is connected an apparatus for sawing and dividing a continuous sheet of sugar, and for placing the pieces thus obtained in boxes.

7640. W. P. Thompson, F.C.S., M.I.M.E., 6, Lord Street, Liverpool. (Communicated from Messrs. Diebl and Mensik, of Prague, Austria.) *New or improved filtering substance for filtering or decolouring liquids, applicable for treating sugar juices, and method of preparing the same.* May 24th, 1888. This invention relates to a filtering substance which can be applied either by itself or mixed with the usual well-known fibrous and granular filtering substances, one of the proposed and prominent applications of the new filtering substance being the treatment filtering and decolouring of sugar juices. The new filtering agent consists essentially of a finely divided vegetable (ligneous) carbonized material, preferably sawdust, which if the case require it may be impregnated with chemical purifying agents. Pieces or blocks of charcoal present to the liquid to be filtered only a reduced surface; powdered charcoal or charcoal dust only allows the liquid to penetrate it with difficulty. In order to avoid the aforesaid disadvantages, the wood is reduced by mechanical means previous to its carbonization into pieces as small as possible presenting a granular or a circular structure, such as that of the particles of sawdust or other waste products from saw mills and the like; the small pieces of wood thus obtained retain their shape without producing any dust after they have been submitted to carbonization.

GERMAN.

ABRIDGMENTS.

43460. W. Knauer, Calbe a S. *Improved apparatus for blueing sugar in the centrifugal.* 2nd October, 1887. A montejus or juice pump containing the ultramarine or blue water, is fixed over the centrifugal in which the sugar is covered. A dispersing pipe connects this juice pump with the centrifugal, this pipe is provided with two rows of oppositely converging holes, so that the liquids forced out by the montejus are brought into contact with one another and become by this means dispersed. The blueing is thus with this apparatus accomplished in a more uniform manner than heretofore.

43484. C. Steffen, Vienna. *Battery for the penetration of sugar filling mass with lye.* 4th May, 1887. This battery consists of several washing or suction vessels with sifting bottoms, over which are vessels divided by vertical partitions into numerous compartments. Or cells, each of which can be filled by a separate tap, adapted to a feeding pipe, and emptied by means of a separate tap provided at the bottom of the cell opening into a common pipe, the contents of which are emptied into the aforesaid washing vessels. The outlet pipe of the latter is combined with the inlet or feed pipe of the next similar arrangement of washing vessels and cell vessels combined as above. The cane sugar or filling mass is in this second battery (as in the diffusion battery process, patent No. 31486,) submitted to a systematic series of washing in solutions of sugar of increasing purity.

AMERICAN.

ABRIDGMENTS.

384718. Frank H. Richards, of Troy, New York. *Centrifugal machine.* June 19th, 1888. This relates to machines provided with a vertical axis. The upper and power-receiving end of the axis has for its bearing a ball and socket universal joint. The lower end, which carries the cage, is therefore free to swing in its bearings, which are mounted in a movable step, the lower side of which is made in the form of an arc, having for its centre the upper bearing. The machine will thus adjust itself to revolve about its true centre of gravity. An elastic (preferably rubber) ball or balls placed in a dished recess between the two opposing surfaces of the lower bearing, limits the pendulous movement within convenient bounds.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

January 1st to July 31st, 1887-1888.

Board of Trade Returns.

IMPORTS.

Raw Sugars.	Quantities.		Value.	
	1887.	1888.	1887.	1888.
	Cwts.	Cwts.	£	£
Germany	3,781,722	2,553,721	2,040,521	1,672,228
Holland	258,051	191,829	139,753	124,520
Belgium	497,738	397,374	260,729	256,592
France	18,464	2,255	11,052	1,805
British West Indies & Guiana	1,727,277	1,644,973	1,219,362	1,311,533
British East Indies	218,009	835,626	99,387	401,523
China and Hong Kong	312	....	201	....
Mauritius	76,040	133,000	40,160	94,550
Spanish West India Islands	153,098	304,376	94,690	223,412
Brazil	453,391	2,005,459	239,826	1,261,494
Java	2,493,510	2,872,780	1,622,518	2,165,422
Philippine Islands	165,825	327,031	75,355	165,100
Peru	226,395	271,136	137,435	201,684
Other Countries	330,740	394,780	186,735	281,985
Total of Raw Sugars	10,400,572	11,934,430	6,167,724	8,161,848
Molasses	215,385	256,511	68,526	78,828
Total Sugar and Molasses	....	....	6,236,250	8,240,676
Refined Sugars.				
Germany	1,605,357	1,869,750	1,226,676	1,630,331
Holland	838,709	793,795	649,401	719,959
Belgium	114,631	120,257	94,559	114,718
France	901,310	483,742	674,545	440,908
United States	724,458	39,548	578,749	36,749
Other Countries	26,408	309,436	10,297	243,478
Total of Refined	4,210,873	3,616,528	3,243,227	3,186,143

EXPORTS.—Refined Sugars.

	Cwts.	Cwts.	£	£
Sweden and Norway	38,704	35,581	26,541	29,640
Denmark	64,207	46,319	34,508	33,933
Holland	38,261	48,727	24,994	35,938
Belgium	24,157	16,528	14,648	11,864
France	22,445	3,603	13,829	2,553
Portugal, Azores, & Madeira	54,622	46,527	31,204	34,324
Italy	49,565	54,614	30,557	40,420
Other Countries	109,417	98,188	73,149	78,516
Total of Refined	401,378	350,087	249,430	267,188

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of July, 1888, compared with the corresponding month of the two preceding years, and the average monthly imports for the year compared with those of 1885, 1886, and 1887, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

Countries from which Sugar has been imported.	"Lumps and Loaves."							"Other Sorts." Including Crushed Loaf, Granulated, Crystallized, &c.							Total.						
	Monthly Average.				July	July	July	Monthly Average.				July	July	July	Monthly Average.				July.	July.	July.
	1885	1886	1887	1888	1886	1887	1888	1885	1886	1887	1888	1886	1887	1888	1885	1886	1887	1888	1886	1887	1888
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
France	1597	1462	1363	1812	1265	1755	1777	463	2688	5099	1643	1757	5509	1464	2060	4150	6462	3455	3022	7264	3241
Holland	3848	3508	3760	3121	3968	4501	5134	1472	1428	2483	2548	2173	3134	3062	5320	4936	6263	5669	6141	7635	8196
Germany & Austria	808	990	1347	1502	1159	1247	1572	3262	6634	10463	11853	6506	8820	12739	4070	7624	11810	13355	7665	10067	14311
Belgium	189	344	592	617	495	647	421	120	113	308	242	186	270	182	309	457	900	859	681	917	603
United States	707	854	454	14	934	1339	54	8869	5078	2804	269	7430	2032	452	9576	5932	3258	283	8364	3371	506
Russia	..	..	3	..	..	..	..	875	3412	452	2207	8355	862	2947	875	3412	455	2207	8355	862	2947
Other Countries	1	..	..	1	..	..	10	24	9	15	2	58	..	10	25	9	15	3	58	..	20
Total	7150	7158	7539	7067	7821	9489	8968	15085	19362	21624	18764	26465	20627	20856	22235	26520	29163	25831	34286	30116	29824

SUGAR STATISTICS—GREAT BRITAIN.

To August 25th, 1888 and 1887. In Thousands of Tons, to the nearest Thousand.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1888.	1887.	1888.	1887.	1888.	1887.
London	67	67	195	207	208	199
Liverpool ..	147	87	195	171	257	181
Bristol	4	3	33	41	33	40
Clyde	37	44	160	149	154	157
Total ..	255	201	583	568	652	577
	Increase..	54	Increase..	15	Increase..	75

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

For the four principal Ports. In Thousands of Tons, to the nearest Thousand. For July, 1888 and 1887.

	STOCKS. August 1st.		DELIVERIES. In July.		IMPORTS. In July.	
	1888.	1887.	1888.	1887.	1888.	1887.
New York	96	147	84	63	60	50
Boston	10	18	17	20	9	18
Philadelphia....	5	5	21	14	21	14
Baltimore	..	..	..	..	..	..
Total......	111	170	122	97	90	82
	Decrease..	59	Increase..	25	Increase ..	8
Total for the year (1888)..			646	722	709	790

For New York Prices for Sugar, August 16, 1888, see page 504.

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE 31ST JULY, FOR THREE YEARS, IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts.*	TOTAL 1888.	TOTAL 1887.	TOTAL 1886.
269	*124	9	*46	31	20	499	503	644

*Estimated.

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING 31ST JULY, IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts.*	TOTAL 1888.	TOTAL 1887.	TOTAL 1886.
1241	415	37	438	227	342	2700	2681	2407

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROP, OF THE THREE PREVIOUS CAMPAIGNS.

(From Licht's Monthly Circular.)

	1888-89. Tons.	1887-88. Tons.	1886-87. Tons.	1885-86. Tons.
France..........	445,000 ..	400,000 ..	486,443 ..	298,407
German Empire ..	990,000 ..	937,500	1,018,842 ..	838,131
Austro-Hungary..	575,000 ..	412,500 ..	523,060 ..	377,032
Russia and Poland.	450,000 ..	430,000 ..	479,582 ..	537,860
Belgium	160,000 ..	135,000 ..	132,570 ..	88,421
Holland	43,000 ..	36,000 ..	32,263 ..	21,244
Other Countries..	62,000 ..	56,050 ..	56,050 ..	55,500
Total....	2,725,000	2,407,050	2,728,810	2,216,595

Mr. Licht makes no change in his estimate for the season 1888-89 this month; he reduces his estimte for the season 1887-88, by 5,000 tons.

N.B.—Mr. Görz's estimate for 1888-89 crop is 2,660,000 tons, or 65,000 tons less than Mr. Licht's.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

There has been a good business done both in raws and refined, during the past month, and prices have been well maintained; in some sorts an advance of about 6d. has been established.

More confidence is being evinced, owing to the statistical position—the fact, however, of beet, for forward delivery, being quoted at from 1/- to 1/6 per cwt. below present rates, makes hand to mouth buying a necessity. Beet 88% is quoted at 14/6 for August-September, 13/4½ October, 12/10½ November-December.

The stocks in the United Kingdom are now some 24,000 tons less than they were a month ago. On the 25th August they were 254,741 tons, against 210,048 tons in 1887, or an increase of 53,693 as compared with the same period last year.

The deliveries on 25th August in the United Kingdom (four principal ports) show an increase upon 1887 of 14,976 tons, and the imports an increase of 75,559 tons.

The imports of foreign refined for the first seven months of 1888 were 180,825 tons, against 210,536 tons in 1887, or a decrease as compared with last year of 29,721.

Present quotations for the standard qualities, as under, are :—

	Floating.		Last Month.
Porto Rico, fair to good Refining	14/-	against	14/-
Cuba Centrifugals, 96°/o polarization	15/6	,,	15/- to 15/6.
Cuba Muscovados, fair to good Refining..	13/6	,,	14/-
Java, No. 15 to 16, good to strong	16/- to 16/6	,,	15/9 to 16/-.

	Landed.		Last Month.
Madras Cane Jaggery..	8/9 to 9/-	against	8/9
Manila Cebu and Ilo Ilo	8/9 to 9/-	,,	8/9 to 9/-.

Paris Loaves, f.o.b...	18/9 to 19/-	against	18/6 to 18/9.
Titlers	20/6	,,	20/3
Tate's Cubes	22/3	,,	21/-
Austrian-German Beetroot, 88 °/o f.o.b..	14/6	,,	13/10½ to 14/-.

THE

SUGAR CANE.

No. 231. OCTOBER 1, 1888. Vol. XX.

☞ **The writers alone are responsible for their statements.**

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to Henry Thorp, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see page iii.

A great deal of correspondence has taken place in some of our London papers,—in the *Daily News* especially, on the Sugar Convention, and for the most part in opposition to it. The jam makers have not been backward in coming to the front. Cheap sugar is essential to the prosperity of their trade. Bounties mean cheap sugar, therefore their abolition must mean dearer sugar; this in short is their argument.

Will sugar be dearer with the bounties done away with? In a normal state of things, we do not think it is likely. Germany can manufacture sugar at to-day's prices even without bounties, and this being so, and Germany being by far the largest producer of sugar, where is the advance to come from? A failure of the crop would send up prices, whether bounties existed or not. The jam makers are wise in their generation; they know that if bounties were abolished, the countries which have given them would be able to reduce the tax on sugar, without loss to the revenue, and so reduce its cost to their own consumers, and the jam makers in those countries would be in a more favourable position to compete with jam makers in this country. Has not this possibility more to do with their hostile position than any fancied violation of free trade principles?

By far the most important letter written in opposition, comes from Sir Thomas Farrer. This letter we give at page 523, to which is appended replies from Mr. Martineau, Mr. Lubbock, and Sir George Baden-Powell, M.P. These replies clearly show how untenable is the position taken up by Sir Thomas Farrer. We also give, at page 538, Mr. Herbertz's views upon the situation.

On the 4th September was issued with the *London Gazette*, a supplement of 220 pages, containing the minutes and papers laid before the International Conferences on the Sugar Question, held in April and May and in August, 1888; price, one shilling. The information furnished by the representatives of the different Governments, here given, is very valuable, and the report of the discussion upon the eleven articles of the Convention, as each came under review, enables one to form some idea of the difficulties which Baron Henry de Worms has had to contend with, in bringing these negociations to the point they have now reached.

The following further results of last year's working of German sugar companies, taken from the *Deutsche Zuckerindustrie*, shows similar, though not quite so extraordinary results, to those quoted last month. In no case is any loss indicated.

Linden-Hannover, which declared in February an interim dividend of 10 per cent. on its capital of M. 464,400, has declared a further dividend of 5%, and carried M. 38,829 to special reserve fund. *Proust* pays a dividend of 7% on a capital of M. 525,000, carrying M. 2,500 to next year's account. *Emmerthal* pays only 4% on a capital of about M. 316,000, carrying M. 3,898 to credit of new account. *Seesen* shows a net profit of M. 47,916; *Northeim*, M. 243,178. *Thiede* pays 10% dividend on its capital of M. 360,000; *Gross Ammensleben*, only 4%; whilst *Rethen a. d. Leine*, with a capital of M. 729,300, only shows a net profit of M. 3,783. *Schaumburg* has made a net profit of M. 27,476.

The failure of the *Tiegenhof* Factory to pay any dividend (mentioned last month) is explained by the amount of net profit being applied to the reduction of previous losses.

Immendorf pays a dividend of 36% on its capital of M. 330,000; *Nörten*, with a capital of M. 1,012,500, has made M. 300,063; and *Demmin*, M. 147,012 net profit. Other net profits are as follows:—*Uslar*, M. 6,978; *Rostock*, M. 172,976; *Offstein* (near Worms), M. 57,030; *Gross-Düngen*, M. 62,673. *Oberlausitz* pays off M. 150,000 of its mortgage debt, and declares a dividend of 8%. The *Ladenze* Factory in the Hennegau (Belgium) shows neither profit nor loss.

Sugar Refining by Electricity has been the subject of considerable discussion during the past month. On the 7th September the Company gave a "demonstration" in New York, in the presence of several gentlemen, amongst others of Mr. Willett, of the firm of Messrs. Willett, Hamlen and Co., whose report we give at page 559. Our readers will see that it is very carefully worded. This demonstration it was stated was only preliminary, and that another and much larger experiment would be made in October. We are now told that this experiment was deemed so satisfactory, that no further ones are considered to be necessary.

We mentioned in our last that the shares were rapidly rising. We learn from the *Financial News* that the shares, which on July 28 were quoted at 21, had risen on August 25, to 50, and on August 27, to 60, at which figure they remained for a few days; on September 4 a fresh start was made, and after "three days of the wildest excitement" they rose to 114—at this time the "demonstration" had not taken place. Notwithstanding the statement that the experiment was so satisfactory we see the present quoted price of the shares is 86. The *Financial News* has given two leading articles on Electric Sugar (September 8 and 21). In the first one, surprise is expressed that this extraordinary rise in the price of these "Electric Sugar" shares has not called forth words of comment in the money articles of some of the leading Liverpool papers, and adds, "It remains therefore for the *Financial News* to enlighten the public on an invention which may not impossibly revolutionize the sugar trade."

The *New York Herald* of September 26th, publishes a synopsis of the Tariff Bill drawn up by the Republican senators to replace Mr. Mills's Bill. According to this the measure effects reductions amounting to about $70,000,000, distributed as follows:—Tobacco, $30,000,000; sugar, $25,000,000; the free list, $5,000,000; and alcohol used in the arts, $10,000,000. All these reductions, except in the case of sugar, amount to little more than a readjustment of existing duties, and some will have the effect of increasing the revenue. The bill makes the duties specific where possible.

As the present tax on sugar yields about $50,000,000, this Republican proposal practically means a reduction of 50 per cent. Mr. Mills's proposal was a more moderate one—viz., about 20 per cent. One thing is very clear, that when an alteration in the tariff is made, the duties on sugar will be greatly reduced.

Mail advices received on September 20, from Cuba, give particulars of the recent cyclone in the island. It appears that it raged on the

4th and 5th ult., over the whole length of the province of Santa Clara, causing considerable damage amounting to millions of dollars. At Sagua scarcely 20 houses escaped injury. The desolation and ruin is complete. The rivers overflowed their banks, and vessels foundered or stranded, while in some cases they were even driven into the streets of the town. Fatalities are reported everywhere. A hundred persons perished at Cardenas and 70 at Caibarien, the total number of deaths in the island being estimated at 1,000. A large number of persons have also been injured by falling *débris.* The vortex of the cyclone entered the island near Sagua, and crossing Havana and Bataband, and through Consolcion del Tur, finally left in the direction of Vera Cruz.

At Sonnenberg (Thuringia) a new factory is to be erected. The new factory at Teterow, which has just ordered its machinery, costing about M. 500,000, from the Halle Machine Factory (Halleschen Maschinenfabrik) will be able to work up daily 6,000 to 7,000 centner of beets, and is the first that has been erected since the crisis of 1884.

The same firm of machinists has got orders for the supply of machinery for a new manufactory in Java. Their apparatus enables the planter to do without coal or wood, while obtaining 9% to 11% yield of sugar. Their mills, according to the *Deutsche Zuckerindustrie*, deliver nearly 80% of the juice in the cane, without dilution, but with double-crushing the yield can be considerably increased.

It is stated that owing to recent serious differences with his Ministers, the Governor of Queensland, Sir Anthony Musgrave, is likely to return home sooner than was originally intended, and that Sir William F. C. Robinson, at present Governor of South Australia (salary £5000), will probably succeed him. It is believed, says the correspondent of the *Glasgow Herald*, that Sir William F. D. Jervois, Governor of New Zealand, will succeed Sir Hercules G. R. Robinson at the Cape. Amongst other forthcoming colonial appointments, it is rumoured that Mr. Walter J. Sendall, the present Governor of the Windward Islands, salary £2500, will succeed Sir Henry W. Norman in Jamaica, salary £6000. The salaries of the Governors of the Cape of Good Hope, Queensland, and New Zealand are each £5000, with allowances.

Cuban Sugar Crop, 1887-88.—A communication has been received from Mr. T. A. Hayley, Her Majesty's Acting Consul-General at Havana, dated August 8th, 1888, stating that the sugar crop of Cuba, for the year 1887-88, amounted to 647,861 tons, being an increase of 21,441 tons, or 3·42 per cent. over 1886-87. The treacle produced amounted to 125,400 tons, being an increase of 6,550 tons, or 5½ per cent. over 1886-87.

THE SUGAR CONVENTION.

The following is the Convention for the Suppression of the Sugar Bounties, signed August 30th at the Foreign Office by Great Britain, Germany, Austria-Hungary, Belgium, Spain, Italy, the Netherlands, and Russia :—

The High Contracting Parties, desiring to insure by reciprocal engagements the total suppression of open or disguised bounties on the exportation of sugar, have resolved to conclude a Convention to this effect :—

Article 1.—The High Contracting Parties engage to take such measures as shall constitute an absolute and complete guarantee that no open or disguised bounty shall be granted on the manufacture or exportation of sugar.

Article 2.—The High Contracting Parties engage: To levy the tax on the quantities of sugar intended for consumption without granting on exportation any drawback or repayment of duties, or any writing off which can give rise to any bounty. To this end they engage to place in bond, under the permanent supervision both by day and by night of the Revenue authorities, sugar factories, and factories which are also refineries, as well as factories for the extraction of sugar from molasses. For this purpose factories shall be so constructed as to give every guarantee against any surreptitious carrying away of sugar, and the said authorities shall have power to enter all parts of the factories. Controlling books shall be kept at one or more of the processes of manufacture, and finished sugars shall be placed in special storehouses giving all proper guarantees of security. As an exception to the principle mentioned in the first paragraph of this article repayment or writing off may be granted of the tax on sugar used in the manufacture of chocolate and other produce intended to be exported, provided no bounty is produced thereby.

Article 3.—The High Contracting Parties engage to place sugar refineries under the same system as sugar factories. Each country may nevertheless keep a refining account, as a means of control, by the system of saccharimetry or any other supplementary control, in order to prevent a bounty on exportation.

Article 4.—Her Britannic Majesty's Government agree not to impose differential duties on cane or beet sugar imported from countries, provinces beyond the seas, colonies, or foreign possessions taking part in the Convention. As long as the Convention lasts, therefore, no higher duties shall be imposed on beet-root sugar than on cane sugar on importation into the United Kingdom or into the colonies and foreign possessions of the British Empire taking part in the Convention. It is agreed, moreover, that sugar imported into the United Kingdom from the countries, provinces beyond the seas, colonies, and foreign possessions taking part in the Convention shall not be subject to duties which shall not equally apply to similar sugar of national origin or manufacture.

Article 5.—The High Contracting Parties and their provinces beyond the seas, colonies, or foreign possessions which do not tax sugar, or which grant on the exportation of raw sugar, refined sugar, molasses, or glucose, neither drawback, repayment, nor writing off of duties or quantities, are absolved from abiding by the provisions of Articles 2 and 3 so long as they maintain one of these systems. In case of any change they shall adopt the system established by Articles 2 and 3. Russia, which levies the tax at one single rate on the whole amount manufactured, and which grants on the exportation of all kinds of sugar a repayment not exceeding such rate, is put on the same footing as the Powers specified in the preceding paragraph, so long as its present system is maintained.

Article 6.—The High Contracting Parties engage to establish a permanent International Commission charged with watching the execution of the provisions of the present Convention. This Commission shall be composed of delegates of the different Powers; a permanent bureau will be connected with it. The delegates shall be instructed :—(*a*) To ascertain whether the laws, orders, and regulations respecting taxes on sugar are in harmony with the principles laid down in the preceding articles, and whether in practice any open or disguised bounty is granted on the exportation of sugar, molasses, or glucose. (*b*) To pronounce an opinion on contested points (" questions litigieuses "). (*c*) To consider (" d'instruire ") requests for admission to the Union made by the States not having taken part in the present Convention. The permanent bureau shall collect, translate, arrange, and publish information of all kinds respecting legislation on and statistics of sugar, not in contracting countries only, but in all other countries as well. In order to ensure the execution of the preceding provisions, the High Contracting Parties shall transmit, through the diplomatic channel, to her Britannic

Majesty's Government, which shall forward them to the Commission, the laws, orders, and regulations on the taxation of sugar which are or may be in force in their respective countries, as well as statistica information relative to the object of the present Convention. Each of the High Contracting Parties may be represented on the Commission by a delegate, or by a delegate and an assistant-delegate. The first meeting of the Permanent Commission shall be held in London after the coming into force of the present Convention. At its first meeting the Commission shall draw up regulations on its internal constitution, and prepare a report on the laws or Bills submitted to it by her Britannic Majesty's Government. The Commission shall be charged with controlling and examining only. It shall draw up a report on all questions submitted to it, and forward the same to her Britannic Majesty's Government, which shall communicate it to the Powers interested, and, at the request of any one of the High Contracting Powers, shall convoke a Conference which shall take such decisions or measures as circumstances demand. The expenses on account of the establishment and working of the permanent bureau and of the Commission—excepting the salaries or expenses of the delegates, who will be paid by their respective countries—shall be borne by all the contracting countries, and shall be divided among them in a manner to be determined by the Commission.

Article 7.—From the date of the present Convention coming into force all raw sugar, refined sugar, molasses, or glucose coming from any country's provinces beyond the seas, colonies, or foreign possessions maintaining the system of open or disguised bounties on the manufacture or exportation of sugar shall be excluded from the territories of the High Contracting Parties. Any contracting Power shall, in order to exclude from its territory raw sugar, refined sugar, molasses, or glucose that has benefited by open or disguised bounties, take the measures necessary therefor, either by prohibiting these articles altogether or by levying thereon a duty which must necessarily exceed the amount of the bounty, and which shall not be levied on sugar not bounty-fed coming from the contracting countries. The High Contracting Parties shall concert as to the measures which the Commission may consider necessary in order to obtain these results, and to prevent bounty-fed sugar passing in transit through one of the contracting countries from enjoying any of the advantages of the Convention. The fact of the existence in any country, province beyond the sea, colony, or foreign possession of a system involving open or disguised bounties on raw sugar, refined sugar, molasses, or glucose, shall be established by the decision of a majority of the signatory Powers of the present Convention. In the same manner the minimum amount of the bounties in question shall be determined. It is agreed that privileges under the most favoured nation clause existing in other treaties shall not be pleaded with a view to evading the consequences of the application of the second paragraph of the present article, even on the part of such States as may hereafter withdraw from the Convention.

Article 8.—States which have not taken part in the present Convention may adhere to the same on their request provided their laws and resolutions in the matter of sugar are in agreement with the principles of the present Convention and have been previously submitted for the approval of the High Contracting Parties in the manner laid down in Article 6.

Article 9.—The present Convention shall be put in force from Sept. 1, 1891. It shall remain in force for ten years from that day, and in case no one of the High Contracting Parties shall have notified twelve months before the expiration of the said period of ten years its intention of terminating the effects thereof, it will remain in force for another year, and so on from year to year. Each of the High Contracting Parties may, however, by denouncing the Convention twelve months beforehand, put an end to it as regards such power at the expiration of the second, fourth, sixth, and eighth years of the said period of ten years. In case one of the signatory Powers should denounce the Convention, such denunciation shall affect that Power only; but the other Powers are entitled, until Oct. 31 of the year in which denunciation takes place, to notify their intention of retiring from August 1 of the following year. Should more than one Power wish to retire a conference of the contracting Powers shall meet in London, within three months, to determine what steps should be taken.

Article 10.—The provisions of the present Convention shall be applied to the provinces beyond the seas, colonies, and foreign possessions of the High Contracting Parties. In case one of such provinces beyond the seas, colonies, and foreign possessions of the High Contracting Parties should wish to retire separately from the Convention, a notification to that effect will be made to the contracting

Powers by the Government of the mother country, in the manner and with the consequences shown in Article 9.

Article 11.—The execution of the reciprocal engagements contained in the present Convention is, in so far as necessary, subject to the formalities and rules established by the Constitutions of each of the contracting countries. The present Convention shall be ratified, and the ratifications exchanged in London on 1st August, 1890, or sooner if possible.

In witness whereof, the respective Plenipotentiaries have signed the present Convention and have attached their seals thereto.

Done at London, the 30th August, 1888.

(Signed)

Salisbury.
Henry de Worms.
Von Hatzfeldt.
Jaehnigen.
Kuefstein.
Solvyns.
Guillaume.
Du Jardin.
C. Del Mazo.
Anto. Batanero.
Dupuy de Lome.
C. Robilant.
T. Catalani.
W. Gevers.
Pistorius.
Bouteneff.
G. Kamensky.

Declaration Annexed to the Convention of August 30, 1888. The Plenipotentiaries assembled to sign the Convention for the suppression of export bounties on sugar have agreed to the following declaration :—Eight months after the signature of the Convention, to which the present declaration is annexed, there shall meet a special commission, at which all the States interested may be represented, with instructions to examine the existing laws, or drafts of laws, for bringing the Convention into force. The Commission in question shall make to the British Government, who shall communicate it to the other Governments interested, a report, showing in what particulars existing or intended legislation in one or other of the contracting countries shall, if necessary, be changed in order to bring it into harmony with the stipulations of the present Convention. Two months at least before the Special Commission meets the laws put in by the different Powers, as suppressing all bounties, shall be communicated to the various signatory Governments.

Protocol Annexed to the Convention of August 30, 1888.—The Plenipotentiaries of the Powers which have signed the Convention of the 30th August, 1888, or which have taken part in the Conference, have taken act in the following declarations:—

Declaration of Austria-Hungary.—Austria-Hungary, being still of opinion that a Convention for the suppression of bounties on the exportation of sugar ought to include all countries of importance as producers or consumers of sugar, gives, although this condition is not yet fulfilled, her adhesion to the present Convention, so as not to compromise the understanding to carry it out. But, having regard to the effect which may be caused by the abstention of one or more of the countries of importance, as producers or consumers of sugar, she can give her signature only with the condition that the adhesion of these countries shall be secured at the moment of the Convention coming into operation, and she reserves, in default of this adhesion, the right to examine and decide whether she is or is not able to put the Convention into execution at the time indicated in Article 9.

Declaration of the Brazilian Government.—The Envoy Extraordinary and Minister Plenipotentiary of Brazil in London makes the following declaration in the name of his Government:—The Government of Brazil adheres in principle to the Convention, while reserving the right to adhere formally thereto after its final adoption by the signatory Powers."—(Signed) Penedo.

Declaration of the Danish Government.—The Danish Plenipotentiary makes the following declaration in the name of his Government:—The King's Government adheres to all the provisions of the Convention, as finally adopted on the 28th August, 1888, with the exception of Article VII., the terms of which would not be in agreement with the obligations undertaken in our existing treaties. The King's Government reserves the right to adhere thereto later, under Article VIII."—(Signed) Barner.

Declaration of the French Government.—The French Plenipotentiary makes the following declaration in the name of his Government:—"The Government of the French Republic adheres in principle to the Convention of the 30th August, 1888, respecting the suppression of bounties, and reserves to itself the right of adhering to it definitively in accordance with the Article VIII., after the adhesion of all the countries producing raw or refined sugar, and after communication to it of the laws by which it is intended to afford complete and absolute security against the granting of any open or disguised bounty on the manufacture or export of sugar."—(Signed) Waddington.

Declaration of the Swedish Government.—The British Plenipotentiaries are authorised to make the following declaration:—"The Swedish Government, whilst reserving the right to adhere to the Convention later, does not think it right at this moment to depart from the attitude of reserve which it has observed hitherto."—(Signed) Salisbury, Henry de Worms.

Declaration of the Egyptian Government.—The British Plenipotentiaries declare further that the Egyptian Government has expressed the intention of adhering to the Convention.—(Signed) Salisbury, Henry de Worms.

Done at London, the 30th of August, 1888.

(Signed)

Salisbury.
Henry de Worms.
Von Hadzfeldt.
Jaehnigen.
Kuefstein.
Solvyns.
Guillaume.
Du Jardin.
Penedo.
C. Del Mazo.

Anto. Batanero.
Dupuy de Lome.
Waddington.
C. Robilant.
T. Catalani.
W. Gevers.
Pistorius.
Bouteneff.
G. Kamensky.

SIR THOMAS FARRER ON THE SUGAR CONVENTION.

With replies from Mr. George Martineau, Mr. Neville Lubbock, and Sir Geo. Baden-Powell, M.P.

Together with the article from *The Glasgow Herald*, on Sir Thomas Farrer's letter.

Sir Thomas Farrer's letter to the *Times* is everywhere spoken of as so "weighty," as though nothing more need be said on the subject—an impression which we think will be removed by the perusal of these replies:—

To the Editor of the "Times."

Sir,—The result of Baron de Worms's labours is before us. The mountain has brought forth!

All the nations who joined in the Conference pronounce sugar bounties to be bad things, except the United States, who maintain a cautious silence. England, Germany, Belgium, Spain, Italy, and Russia promise one another that they will boycott bounty-fed sugar, wherever it comes from.

The United States hold aloof altogether; Austria reserves her final adherence until all European sugar-producing and consuming countries also adhere; Brazil reserves her freedom; Denmark refuses to boycott because it would be a breach of treaties; France reserves her adherence until all sugar-producing and consuming countries adhere, and until she is satisfied with their laws; Sweden refuses to bind herself in any way.

France, Austria, and Brazil are great sugar-producing countries. Except ourselves, the United States are the largest consumers of sugar in the world, and they are also large producers.

Consequently the effect of our boycotting bounty-fed sugar will not be to prevent its being made or sold, but only to prevent our own people from getting the benefit of it. France, Austria, Brazil, the United States, or other sugar-producing countries may continue to give bounties, and the only effect or tendency of the Convention will be to make it dearer here than it is now, and cheaper in non-boycotting countries. Any countries which still choose to give bounties will find markets in the United States and elsewhere.

The Convention is to be worked as follows:—The countries which are really parties to it are, besides ourselves, Germany, Holland, Belgium, Russia, Spain, and Italy, of which Germany, Holland, Belgium, and Russia are large sugar producers. Egypt may be left out of the question.

These six nations, with ourselves, are to constitute a Commission, which is to sit in London. This Commission is to report what sugar in any country is bounty-fed, and, if bounty-fed, to what extent. This is one of the most perplexing technical questions which financial necessities have ever inflicted upon legislators—a question which all the cleverest experts of the ablest Governments have hitherto been unable to solve. Upon reports thus obtained a majority of the signatories to the Convention is to decide, and their decision is to rule the action of the Governments parties to the Convention, and to bind those Governments to boycott sugar, from whatever country or colony it may come, which is that determined to be bounty-fed. In other words, Germany, Holland, Belgium, Russia, Spain, and Italy, or any four of them, being themselves competitors in our markets for the sale of their own sugars, are to determine whether we shall buy sugar from the United States and Sweden, who will certainly not be parties to the Convention, or from France, Denmark, Austria, and Brazil, who at present reserve their adherence and may probably not be parties to it, or from any other sugar-producing countries. Germany, Holland, Belgium, and Russia get from us a promise that we will boycott any sugar from other countries which they or a majority of the parties to the Convention for the time being, pronounce to be bounty-fed, the only consideration which they give us for this mischievous and embarrassing obligation being a promise on their part that they will not themselves send us cheap, bounty-fed sugar or receive it themselves.

Further, the parties to the Convention undertake that the most-favoured-nation clause—which is, of course, an obstacle to boycotting—"shall not be pleaded with a view to evading the consequences of the stipulation for the exclusion of bounty-fed sugar." This is all very well as regards the signatories to the Convention; but as regards other countries who are not parties to it, it has no effect at all, and since we have most-favoured-nation treaties with many of such countries, we shall expose ourselves to just complaint and retaliation on their part if we boycott their sugars at the instance of competing nations who are parties to the Convention. According to a return made in 1879, we have most-favoured-nation treaties with the Argentine Republic, Austria, Chili, China, Denmark, Portugal, Sweden, Turkey, and the United States, not to mention less important countries.

Further, there are in the Convention stipulations binding our colonies to adhere to it, but providing for their withdrawal. The operation of these clauses is obscure, and may not be unimportant if, as I believe to be the case, some of them do now give bounties. It would be a curious operation of the Convention if we were forced by it to boycott our own colonies. But, however this may be, one thing is quite clear—viz., that we promise, both for ourselves and for all our colonies, that we and they will not, under any circumstances, show any favour to the sugars of our West Indian and other colonies or possessions over that shown to the beet sugars of their rivals in Europe.

I might go further and show how the Convention will operate in throwing upon us and upon the other Governments parties to the

Convention the obligation, not only of examining and supervising the management of all sugar factories and refineries in countries parties to the Convention, but also of forming a judgment on the operations of manufacture in countries not parties to the Convention. But it is scarcely necessary to go further. It is obvious that the stipulations noticed above will entangle us in a web of complicated and embarrassing commercial and financial restrictions. They will not put an end to bounties; but they will tend to make sugar cheaper to non-boycotting nations and dearer to ourselves; they will involve us in vexatious prohibitory legislation; and will probably also involve us in breaches of valuable commercial treaties.

These observations on the details of the Convention leave almost untouched the larger question—whether, under any circumstances, it can be right for this country to retaliate upon foreign bounties for the purpose of putting an end to them. Foreign bounties are very bad things, but foreign protective duties are worse. We do not retaliate upon foreign protective duties, which have no compensating advantages for us, because it is not our interest to do so. And, *a fortiori*, it is not to our interest to retaliate upon bounties the compensatory advantages of which to us are very great, and probably, in the case of sugar, preponderate over the disadvantages.

Putting aside for the moment this large question—on which there is a great deal to be said—it is obvious that this Convention, while it may help some other countries to improve their own foolish systems of taxation, must embarrass and injure us. It restricts our freedom, it is the first great departure from the wise policy of the last 50 years, and it throws doubt on our advocacy of the principle of free imports. It does not put an end to bounty-fed sugar, but it diverts the stream from countries which are foolish enough to boycott it to countries which are wise enough to receive it, and thus tends to make sugar cheaper to our neighbours and rivals and dearer to ourselves.

It is well that the ratification of such a Convention should be delayed for two years. Much may happen in that time. If this and no more than this is the result of Baron de Worms's much be-trumpeted exertions, we may conclude that their real object is rather to produce an effect on certain constituencies than to form a ground for practical legislation. But, even if no further harm ensues, we may be permitted to regret the somewhat undignified spectacle of an English Minister making the round of Europe, cap in hand, teaching foreign Finance Ministers their business, advising them not to tax their own people for our benefit, and humbly beseeching them not to make us a present of cheap sugar. What wonder if they make such a Minister their catspaw!

Bounties, like protective duties, are bad things; but this is not the way to get rid of them.

T. H. Farrer.

Abinger Hall, September 3rd.

The following replies to the foregoing letters also appear in *The Times*:—

To the Editor of "The Times."

Sir,—There is one statement in Sir Thomas Farrer's letter which, as it is repeated four times, and is in fact the text on which his whole remarks are based, requires to be contradicted if your readers are not to be misled. The effect of the Convention, he says, will be to make sugar dearer here and cheaper in other countries. I have already in my former letters pointed out that this is impossible. This country receives sugar from all parts of the world, and has 5,000,000 tons to choose from. Bounty-fed sugar is sold at the same price as other sugar, and all other sugar is, and must be, sold at the same price as bounty-fed sugar. The only effect the Convention will have will be the general abolition of bounties, which Sir Thomas Farrar declares to be bad things. But though he makes this admission he harps on the great benefit which our own people derive from bounty-fed sugar. What is this benefit? Is it a good thing artificially to stimulate production in one place, and thereby hinder and discourage production all over the world? Is it a good thing that consumers should be dependent on one particular crop to such an extent, that, whenever it is slightly less prolific than usual, prices rise 50 per cent.? Until Sir Thomas Farrer answers these questions he has no right to pretend that we are being robbed of a benefit by the abolition of bounties; and unless he shows that there are two prices for sugar his whole contention is baseless.

The other points in his letter are that the ascertaining the existence and amount of a bounty is impossible; that the most favoured nation article in our treaties is an obstacle; that retaliation is against our principles; and that the Convention restricts our freedom. I venture to point out, as briefly as possible, that Sir Thomas Farrer is mistaken on all these points. There was a time when our assertions as to the existence and amount of the bounties were disputed—by Sir Thomas Farrer among others. But now the foreign Governments have saved us further trouble on this point by stating periodically the amount of their bounties very accurately. So far from the most-favoured-nation article being an obstacle it turns out to be exactly the reverse. It has been urged at the sittings of the Conference that a country having such a treaty with us can properly complain that the admission of bounty-fed sugar destroys the equality which the most-favoured-nation article is intended to secure. As to retaliation it is most unfair to pretend that there is any parallel between the absurd and useless policy of retaliating against protective duties and the very simple and practical process of destroying protection to foreign producers on British markets by the method proposed in the Convention. The one is easy and effectual, the other impossible and futile. Moreover, there is no retaliation in securing a bounty for the revenue, or in giving a security to the contracting Powers, that bounties shall no longer operate to their disadvantage. Lastly, how does the Convention restrict our freedom? Sir Thomas Farrer says it throws a doubt on our advocacy of free imports. Why, then, do we prohibit goods bearing false trade marks? So long as bounties continue it cannot be said that "free imports" apply to sugar. Those who import sugar must be prepared to compete with sugar which receives a subsidy. Is this freedom?

Having already addressed you on this subject I should not have ventured again to trespass on your valuable space, but as Sir Thomas Farrer has taken for his axioms the very points which I had already disproved, and as the *ex cathedrâ* style of his letter is likely to carry great weight, I again beg for your kind indulgence.

I am, Sir, your obedient servant,

George Martineau.

Carlisle Station, Sept. 6th.

To the Editor of "The Times."

Sir,—The letter in your columns of yesterday on the subject of the Sugar Bounties Convention from Sir T. H. Farrer will be read with the attention to which anything coming from the pen of the late permanent chief of the Board of Trade is naturally entitled. That the Convention should be as gall and wormwood to him will cause no surprise to those who have for years past watched the intense—I had almost said the acrimonious—zeal which he has displayed in preventing anything whatever being done to bring about a cessation of bounties.

Sir Thomas Farrer says, "Bounties, like protective duties, are bad things, but this is not the way to get rid of them." Perhaps he then would explain how he would get rid of them. The doctrine was preached many years ago that foreign Governments, if left alone, would abolish bounties themselves. This has been tested for 25 years, with the result that the policy of giving bounties, so far from being abandoned, has been largely extended. Your correspondent taunts the Government with going cap in hand to foreign Powers, but this has been rendered necessary by the commercial policy of this country for the last half century. Would he have wished the Government to follow the example of Spain, who, when she wished us to reduce the duties on her wines, did not come to us cap in hand, but imposed 30 per cent. extra duty on English goods going into Spain? Although this measure was successful, it was one which Sir Thomas Farrer would hardly wish to see imitated by our Government.

Your correspondent speaks more than once of cheap bounty-fed sugar in such a way as to lead anyone who was excessively ignorant into the belief that bounty-fed sugar is cheaper than non-bounty-fed sugar. I need hardly say that this is not, and never can be, the case, either with or without the Convention. Sugar, bounty-fed or otherwise, will sell at the same price in the same market relatively to its value at all times.

Sir Thomas Farrer fears that we may possibly under the Convention be prevented from buying sugar from the United States and Sweden. The United States produce less than 200,000 tons, and consume more than 1,200,000 tons, so that they are not likely to have any surplus sugar to send us for some time to come. Sweden may or may not export sugar, but if she does the quantity is so small that it finds no place in any published returns available to those interested in the sugar industry. He also throws out some doubts respecting France, Austria, Brazil, and Denmark. But the quantities of sugar we receive from France and Austria are comparatively small, while from Denmark we receive none at all. But as regards Austria and Brazil, there can hardly be a doubt as to their adhesion to the Convention, and I believe it will be found that France will also come in. But even if these Powers remain outside, the total amount of sugar available for export from France and Austria is hardly one-twentieth of the world's supply, and the effect of excluding their sugar would consequently be absolutely inappreciable upon the price. Moreover, it must be borne in mind that it is only sugar receiving a bounty that will be boycotted. Brazil does not give a bounty, so that her sugar would in no case be shut out; and as for France and Austria, these Powers are solemnly committed by their declarations in the protocol to the policy of suppressing bounties.

Further, a complaint is made that the process of ascertaining whether sugar is bounty-fed or not, "is one of the most perplexing technical questions which financial necessities have ever inflicted upon legislators—a question which all the cleverest experts of the ablest Governments have hitherto been unable to solve." But this is a complete mistake. It is quite true that some of the authorities of the Board of Trade, while Sir T. Farrer was its chief, professed to find great difficulty in ascertaining whether bounties were granted or not in certain countries, but no such difficulty has been found by foreign officials, and the countries giving bounties are perfectly well known not only to them, but to all concerned in the industry. I should be sorry to think that the officials of our own Board of Trade, under their late chief, were lacking in intelligence as compared with foreign officials; but if Sir T. Farrer, when alluding to "the cleverest experts of the ablest Governments," meant to refer to his own department, there is, I fear, no other conclusion to be arrived at.

Further, some alarm is expressed at the possible effect the Convention may have in preventing our colonies from giving bounties, and that we may have to boycott their sugar. It is really quite amusing to see Sir Thomas Farrer posing as the friend of our colonial sugar industries, and professing alarm on their account; but I am happy to be able to reassure him. The colonies are included in the Convention, and all their sugar industries are fully represented upon the British and Colonial Anti-Bounty Association, of which I am the chairman, and I am in a position to say that there is not the slightest fear of our having to boycott any colonial sugar whatever.

It is not for me to say whether Sir T. Farrer's allusions to Baron Henry de Worms are in good taste; but I do know that those who are practically acquainted with the subject are best able to appreciate the great ability shown by the baron in overcoming the difficulties he has had to contend against—difficulties which Sir T. Farrer, in spite of his condemnation of bounties, has certainly not assisted to remove.

I believe the services rendered by Baron de Worms will be more generously appreciated by an unprejudiced public, as I know they are by our sugar-growing colonies and the home industries connected with sugar.

I am, Sir, your obedient servant,
N. Lubbock, Chairman of the British and
Colonial Anti-Bounty Association.
Billiter House, Sept. 6.

Sir George Baden-Powell, M.P., also replies to Sir Thomas Farrer, in a letter which appears in *The Times* of September 17, as follows:—

Sir,—Away from home, I have just read Sir Thomas Farrer's critique of the new Sugar Bounties Convention, summed up in his final sentence, "Bounties are bad things, but this (Convention) is not the way to get rid of them."

One of the most important objections advanced by Sir Thomas Farrer is thus stated:—

"The parties to the Convention undertake that the most favoured nation clause . . . shall not be pleaded with a view to evading the consequences of the stipulation for the exclusion of bounty-fed sugar. This is all very well as regards the signatories to the Convention; but as regards other countries, who are not parties to it, it has no effect at all; and, since we have most favoured nation treaties with many of such countries, we shall expose ourselves to just complaint and retaliation on their part if we boycott their sugars at the instance of competing nations who are parties to the Convention."

Sir Thomas Farrer, than whom no one has greater experience in sugar negotiations, has here hit the great fault of this Convention.

I may be, perhaps, permitted to recall the fact that the main provisions of this Convention, with the exception of that constituting a permanent commission, are suggested in the memorandum I wrote in July, 1884, detailing the reasons for calling together a new Conference—a memorandum sent to the Board of Trade with a covering despatch in which the Secretary of State for the Colonies (Lord Derby) said:—

"As Her Majesty's Government are obliged to decline some of the proposals made by planters and merchants for remedy of their losses, such as a countervailing duty, it appears to Lord Derby very desirable to meet their wishes in any legitimate manner which may be open to Her Majesty's Government. As all parties, therefore, are agreed in condemning the principle of bounties on production or export, Lord Derby is of opinion that Her Majesty's Government might very properly make the effort now desired to procure the reconsideration of the principle at a European Conference, and he would be glad to see such a Conference convoked without delay."

In November of that year I had occasion to point out the lessons afforded by previous Conferences:—

"They have discussed and condemned various palliatives, and on separating from the last Conference in 1877, they had so far come to the general conclusion that manufacture under excise supervision was a good and complete remedy. The hitch lay in obtaining a general assent to the institution of the system. Would all the countries bind themselves in solemn convention to the one system? . . . There was no compelling power; . . how were recusant States to be dealt with? . . . Some one or other Government may not see its way to sign some particular convention. Against such recusant States two penal clauses have been suggested; . . . a countervailing duty; . . . and absolute prohibition of all imports of sugar from countries were bounties are allowed."

I then suggested a further "penal clause," which you permitted me to repeat in your columns last December as the third of three simple articles in a convention, which were:—

"I. The signatories bind themselves individually to (1) forbid bounties being obtained on sugar within their frontiers; and (2) to make it penal to obtain drawbacks in excess of what has been paid in duties.

"II. The signatories bind themselves, whenever they wish to raise revenue from sugar, only to allow manufacture or refining under excise supervision.

"III. The signatories declare that, without reference to country of origin, all articles which have received a bounty on export are, *ipso facto*, in a different category, as imports, to articles which have not received bounties."

The first of these clauses reappears in the first clause of the Convention, but with the omission of the practical measure suggested in its latter half. The present Convention only forbids the granting, and not the obtaining, of bounties.

The second of these clauses reappears in Clauses II. and III. of the new Convention.

But the third of these clauses, the common compelling clause, the penal clause that is the turning-point of the whole question, is conspicuous by its absence. The Convention does, indeed, arbitrarily determine that in England, but not apparently in any other country, beet sugar and cane sugar are to be considered identical, but it refrains from asserting, what would be of some practical use, that bounty-fed sugar is not identical with sugar not bounty-fed. Article VII., it is true, in somewhat involved terms (and every word added to a treaty is a fresh opportunity for evasion and indifference) provides for prohibition and countervailing duties; but, as Sir Thomas Farrer has pointed out, this clause does, in fact, clash with the most favoured nation clause existing in so many treaties and of unchallenged effect with regard to countries which have not signed the Convention.

My suggestion is that the signatories declare bounties on export to be an infringement of the principle of equal treatment; and that they accordingly place bounty-fed goods in a separate category as imports; but without any regard to country of origin. They simply declare that if any sugar has received a bounty on export it will come under such-and-such a heading in the tariff; if it has not received a bounty, it will enter under a different head. For instance, France might place a duty of ten francs on bounty-fed, and one franc on non-bounty-fed sugar. Then if the United States refuses and Germany agrees to join the new Convention, the American sugar entering France would pay ten times the duty charged on German. I confess to much surprise that the grasp of the subject was not more comprehensive and that this new Conference has merely, as it were, officially confirmed or registered the conclusions of its predecessors, but without taking the further and necessary step of devising some common compelling power.

I would add that perhaps Sir Thomar Farrer hardly values, as some do, the permanent Commission created under the new Convention. As he truly points out, the complexities of the bounty system have perplexed even the most expert of experienced officials; but, as I understand it, this Commission is brought into existence in order to introduce, by the majority vote, a practicable finality in the otherwise interminable differences as to details.

I must also express, in all deference, dissent from Sir Thomas Farrer's concluding regret, that an English Government should endeavour to advise foreign Governments not to tax their own people for our benefit, and beseech them not to make us a present of cheap sugar. As a matter of fact these bounties not only interfere with the free course of industry and commerce, but also lead consumers to consume that sugar which it costs most to produce, merely because certain taxpayers are foolish enough to indemnify the producers in their consequent losses. The bounty-fed beet industry is on the whole a drain, and not a gain, to production in any country. Moreover, the prosperity of the United Kingdom is injured whenever the prosperity of any other country is injured. We are, as a nation, dependent in a special degree on exchange with other nations, and in most of them we hold much invested capital; we have a large stake in their prosperity, and ours suffers when theirs is impaired. Bounties do not tax foreigners for our benefit unless they also, on a balance, benefit the foreigner; there is no balance of advantage in our obtaining cheap sugar, even assuming bounties enable us so to do, if the purveyors of that sugar, who are customers of ours, provide us with it at a loss to themselves.

These are among the main reasons why the bounty system is a "bad thing" for us. With the necessary addition of a "common compelling" clause, the Convention resulting from this last Conference will, it may be hoped, deal a fatal blow at that "bad thing"—the bounty system.

I am, Sir, your obedient servant,

George-Baden Powell.

The *Glasgow Herald*, a paper which has not always viewed with favour the proceedings of the anti-bounty agitation, has, in its issue of September 12th, an excellent article on the Convention. It says:—

"The 'weighty remarks' of the ex-Secretary to the Board of Trade in the *Times* of the 6th September, contain some rather bitter and entirely gratuitous 'flings' at Baron de Worms; a number of specific and palpable mistakes are enunciated with an air of complacent authority, and there is the same unjustifiable charge that the Unionist Government attack the principle of Free Trade, which was trumped up by Mr. John Morley and Mr. Gladstone when the increased duty on champagne was under discussion.

"The terms of the Convention for the suppression of sugar bounties agreed upon by Great Britain, Germany, Belgium, Spain, Italy, and the Netherlands at the Foreign Office on the 30th of August, will undoubtedly form the subject of one or more debates in Parliament, and probably the Opposition will do their best to twist the whole question so as to serve party purposes. Yet it will be hard to get over the fact that Baron de Worms has succeeded in bringing an international wrong and grievance of nearly twenty years' standing before the concert of Europe for adjudication. Sir Thomas Farrer, in his letter to the *Times*, sneers at "an English Minister making the round of Europe, cap in hand, teaching foreign Finance Ministers their business." Provided that such course of instruction will benefit the people of Great Britain and her colonies, it is hard to see how an "English Minister" could better earn his salary. Meanwhile one remembers the enthusiasm created in this country when Richard Cobden went over to Paris, and, in the company of Michel Chevalier, taught "the man of the Second of December" his business. What must be especially galling to Sir Thomas Farrer, and perhaps to Mr. Gladstone, is the knowledge that the friendly and cordial relations between the present Government and the great Continental Powers have alone made it possible to induce the latter to approach the difficult and delicate question of the sugar bounties. There may be the further galling recollection of Sir Charles Dilke's efforts to negotiate a commercial treaty with France in 1881, and of the results in that case. But all the time, the drift of Sir Thomas Farrer's remarks is that in the Convention of the 30th of August Great Britain has been hoodwinked, while Baron de Worms has been made a "catspaw." The proof of this theory is not very forcible. According to Sir Thomas Farrer, those five nations –the United States, France, Austria, Denmark, and Brazil—which have refused to join in the Convention to "boycott" bounty-fed sugar are to benefit at the expense of Great Britain. As they have declined to take any share in Baron de Worms's alleged folly, it is hard to see how they have hoodwinked him or made him a catspaw. Is there, however, any probability the abstaining nations will benefit at our expense? Sir Thomas Farrer, in his letter, declares more than once that they will. He says:—

"The only effect or tendency of the Convention will be to make sugar dearer [to us] than it now is, and cheaper in the non-boycotting countries [France, Austria, the United States, Denmark, and Brazil]. . . . . It [the Convention] diverts the stream from countries which are foolish enough to boycott it to countries which are wise enough to receive it, and thus tends to make sugar cheaper to our neighbours and rivals and dearer to ourselves."

"We are thus asked to ignore the heavy or prohibitory duties on foreign sugar maintained by the nations which have stood out from the Convention, and to imagine the Austrians and Americans allowing their markets to be flooded with imports of French bounty-fed sugar, and *vice versa*. The chances of Brazil importing beetroot sugar from those countries need hardly be discussed. The fact is that the agreement of such nations as Germany, Russia, and Belgium to the new Convention places a tremendous weapon in the hands of those who wish to abolish bounties altogether, and if carried out must speedily make an end of a system which really depended for its existence on the British market. Some of Sir Thomas Farrer's minor blunders have been exposed by correspondents in the newspapers. He dwells in exaggerated language on the difficulty of discovering whether sugar coming from any particular country is bounty-fed or not. Probably there was such a difficulty during Sir Thomas Farrer's *régime* at the Board of Trade. There is none now, as foreign Governments themselves supply periodically exact information on the point. He seems further to have blundered as to the effect of "the most-favoured-nation" article in treaties subsisting between Great Britain and those countries whose sugar is henceforward to be "boycotted" by the signatories to the Convention, and he does not seem to have been aware that our own colonies were represented at the Sugar Bounties Conference. There is not the smallest probability that we shall ever be called upon to boycott colonial sugar, seeing that nothing but the existence of a ring of bounty-paying European nations could tempt the colonies themselves to resort to bounties.

"We have pointed out more than once that false hopes and anticipations were constantly raised by those persons in this country who agitated most vigorously against the sugar bounties; and neither Baron de Worms nor his colleagues have endorsed or adopted all the proposals and arguments of that school. "Countervailing duties" and similar nostrums have been recommended, and it has been proposed to revive certain branches of sugar refining in this country which had really died out "on their merits" a quarter of a century ago. No such hopes are raised by the Government or the Board of Trade. What has been effected is an agreement of six European Powers to put a stop, if possible, to an unfair and almost nefarious system, which acted as a trade monopoly of the worst kind, and virtually throttled the production of sugar outside the ring of bounty-paying nations. Of recent years we have imported some 400,000 tons of bounty-fed sugar, and the estimate generally received is that the British consumer gained about 6d. per cwt., or £200,000 annually, by the folly of Continental Governments and taxpayers. What the British Empire lost by the arrangement is probably ten times that amount. Free Traders do not need to be told that if the Convention results in stimulating the growth and production of raw sugar in the West Indies, in Northern Australia, in Fiji, in North Borneo, and in the new African Empire just opening, the demand for British manufactures, to exchange for colonial sugar will grow and multiply *pari passu.* As things stand, the British Empire contains a vast area of sugar-growing territory. Capital and energy are available for its development, and in British territory labour can be procured under the most equitable, and therefore, in the long run, most favourable, conditions. Hitherto the bounty system has hung like a cloud over the sugar industry in our colonies. British sugar producers lived constantly in dread of the market being upset and their calculations frustrated by some new and extravagant development of the bounty system on the Continent. This danger once removed, an enormous expansion of cane sugar production throughout the Empire would be only a matter of time. Meantime the free ports of Great Britain must remain the great market for sugar, and the price will continue to be fixed here. Whether the sugar refining trade is to be revived in the old localities or not will, at all events, become an open question, to be decided on its fair merits, provided Baron de Worms's efforts to get rid of the sugar bounty incubus by concerted action among the great Powers are followed up and crowned with success."*

Sugar Consumption in the United States.—Messrs. Willett & Hamlen, in their *Circular* of September 13th, 1888, state that the actual consumption for the six months (January to June, 1888,) is 16,616 tons more than for the corresponding six months of last year (2 4·10 per cent. increase), and 32,595 tons more than for same time in 1886, and 88,497 tons more than for same time in 1886.

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*Under the head "Continental Comments on the Sugar Convention" we give Mr. Herbertz's remarks, *in extenso*, on Sir Thomas Farrer's letter. See next page

CONTINENTAL COMMENTS ON THE SUGAR CONVENTION.

The French journals express their satisfaction at the refusal of their representatives to sign the Convention. The *Journal des Fabricants de Sucre*, remarks that their delegates have found out somewhat late, but "better late than never," that the Convention was a snare which would ultimately involve the ruin of the French sugar industry. M. B. Dureau says, the authors have nothing to be proud of in the results hitherto obtained, and it is even incomprehensible how such a treaty, without any practical sanction, and having no value other than that of a purely theoretical conception, could ever have seen the light. Whatever lot may be reserved for it, other treaties of the same nature, embracing a less extended circle of interests, and concluded under less difficult circumstances, as for example, the "Convention of Drawbacks" in 1864, have had nothing but an ephemeral existence, constantly brought in question by disputes from which this present Convention would be less exempt than any of them, and which would speedily bring to the acme of discord the interests which it is supposed to conciliate.

The *Sucrerie Indigène* observes:—"We are at last rid of that nightmare, the International Sugar Convention. . . . . France is far from standing alone, for, to say nothing of those countries which have not sent representatives to the final sittings of the Conference (such as the United States, which cannot, however, be left out of the calculation), some amongst the powers represented have signed merely to serve their own immediate interests, others with reluctance, and others, finally, have made negative declarations like herself, though none of these in such precise and dignified terms."

Sir Thomas Farrer's letter to the *Times* is referred to by the French papers, as indicating the diversity of opinion in England itself, which is likely to lead to serious difficulties when the matter comes before Parliament. The *Deutsche Zucker Industrie* criticises this letter in an unfavourable sense, and the remarks of Mr. Herbertz seem worthy of reproduction *in extenso*. The following is a translation:— "Before proceeding to discuss the putting into operation of the Convention in individual countries, we will take a glance at the difficulties which await it in its first steps through the Parliaments, to be ratified by the various Governments. Scarcely was it signed, when the *Economist* (in its issue of the 1st September), and Sir

Thomas Farrer, formerly Secretary to the Board of Trade, in a communication to the *Times* of the 5th September, published articles in which it is regarded almost in the light of a stillborn child.

Sir Thomas Farrer, who is especially keen and minute in his unfavourable criticisms of the Convention, asserts that the only effect it would have would be to make sugar dearer in England and cheaper in those countries which have stood aloof. The first of these arguments is not new, and might, if it were applicable, have considerable force, although in our opinion not conclusive in its effect. A few figures will, however, suffice to show its inaccuracy. The imports, &c., for the United Kingdom, reduced to tons of raw sugar, were as follows:—

	1887.	1886.	1885.
Imports	1,287,248	1,160,773	1,265,745
Exports	79,442	92,965	88,817
Consumption	1,207,806	1,067,808	1,176,928

	1887.	1886.	1885.
Exports from—			
The English Colonies	483,548*	483,548	507,861
Germany	636,456	581,270	538,983
Cuba	584,248†	565,136	512,696
Total	1,704,252	1,629,954	1,559,540

These three sources of supply are thus of themselves sufficient to provide nearly 50 per cent. more than what is required by England, and we have therefore no need to mention other exporting countries, such as Java, with an average of 350,000 tons,—the Philippines, with 200,000 tons, &c., &c. The competition in the English market is therefore being maintained to an extraordinary extent, and this fact disposes of the second part of Sir Thomas Farrer's assertion. But we may judge how far he carries his contentions from the fact that he sees in the Convention a danger of England's being prevented from buying sugar in *Sweden*, a country that never exports sugar, but requires to import in comparatively large quantity. No doubt, in the tables drawn up by the Board of Trade (as we see from the *Bulletin de Statistique*) there figure imports from Sweden for 1886 to the amount of 13,200 cwts., but this was Russian sugar, just as Russian sugar also goes to England by way of Germany, and is tabulated as imports from Germany. Sir Thomas Farrer ought surely to know this.

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* As the official statistics for 1887 are not yet published, we have taken the figures for 1886.

† The figures for the crop and exports of Cuba differ considerably; we have taken the lowest.

In England the opinion prevails to a considerable extent that the suppression of the premiums would have the effect of curtailing the production of beet sugar, and consequently of raising the prices of sugar in general. As far as can at present be seen there will be no such curtailment; the sugar production of the last two campaigns has fallen short of what is required by the world's market, as may be seen from the visible stocks, viz.:—

Stocks in the Principal Countries in Europe, the United States, and Cuba.

	Tons.
On the 1st August, 1888	838,631
,, ,, 1887	981,010
,, ,, 1886	1,092,363

And the small amount of stocks in August of the present year assumes all the more importance, when the invisible stocks must have been very much run down, in consideration of the higher prices existing for some months for immediate, as compared with future, deliveries.

Whether the beet sugar crop will be materially larger this year than last is at the present moment very doubtful, and as regards the cane sugar crop the question is still more doubtful, seeing that just lately it has suffered in Louisiana, and more especially in Cuba, from violent storms. A year hence the stocks thus diminished may have become still smaller; at any rate, they will not have regained their average dimensions. Therefore, as we have for present and for future delivery remunerative prices, we may look to these also for next year, which would exclude any probability of a reduction in the cultivation. If, therefore, the convention comes into operation on the 1st September, 1891, then the reduction or abolition of the sugar duties, which comes into force at the same time, will lead to a universally satisfactory extension of cultivation in the case of both beet and cane.

A more weighty objection than the raising of sugar prices is found in the reference to the "most favoured nation" clause, which is said to stand in the way of the forbidden importation agreed on, and of the introduction of differential duties. But in this case we have a decisive precedent in the Convention of the 8th November, 1864. This arrangement, made between Great Britain, France, Belgium, and Holland, with the like object of abolishing premiums, contained in Articles 13 and 16 important mutual concessions as regarded the sugars of the four contracting powers. In pursuance of this, for example, France abolished the surtax of 2frs. per 100kilos. on Belgian, English, and Dutch sugars; but a similar preference was in no case granted to, or, as far as we know, demanded by, any other country, on the basis of the "most favoured nation" clause.

France cannot, therefore, take retaliatory measures against England, as the *Economist* fears, if, in accordance with the provisions of the Convention, in which it is open to any country to participate, the latter should forbid the import of French sugar.

The Convention of the 8th November, 1864, affords another lesson. According to Article 19, the contracting powers had reserved an understanding to levy differential duties on the premiumed sugars of other countries. The understanding never came to a practical issue, and so the Convention was fruitless in results. That which has just been concluded will remain equally fruitless, if the provisions directed against countries which give premiums are not maintained. Whether it will ever come to forbidding import, or levying differential, duties in case the premiums are maintained, is a question that deserves further consideration.

THE RUSSIAN SUGAR INDUSTRY.

Production, Revenue, and Drawbacks for past Ten Years.

Poud = 36lbs. Gold Rouble = 3s. 2d. 100 Copecks = One Rouble.
Desiatine = 2·7 acres. Vedro = 2·7 gallons.

The French *Bulletin de Statistique et de Legislation comparée* for the month of July last, gives the following particulars of the Russian sugar industry, extracted from a report published by the Russian Administration of Indirect Taxes.

The total revenue arising from the tax on sugar was, in 1886, 20,650,022 roubles, an amount much in excess of that of preceding years, as a reference to the following statement will show.

Produce of the duties on sugar:—

Years.	Excise.	Licence.	Fines.	Repayment of Bounties.	Total.
	Roubles.	Roubles.	Roubles.	Roubles.	Roubles.
1876	4,850,809	76,037	66,151	....	4,992,997
1877	6,616,048	68,385	91,387	....	6,775,820
1878	4,972,553	58,755	63,511	....	5,094,819
1879	4,537,814	48,395	48,267	....	4,634,476
1880	4,169,537	51,409	36,355	....	4,257,301
1881	3,590,772	63,190	40,581	....	3,694,543
1882	7,962,258	85,411	7,378	....	8,055,047
1883	8,783,177	89,079	5,967	....	8,878,223
1884	12,252,953	96,217	46,594	....	12,395,764
1885	13,676,172	109,409	77,011	....	13,862,592
Average for 10 years..	7,141,209	74,629	48,320	....	7,264,158
1886	18,942,243	141,794	65,472	1,500,513	20,650,022

The rapid increase of revenue since 1882 is explained first by the increase in the production of sugar, and also by the new method of collection of the excise, and by the increase of the duty from 50 copecks to 65 copecks, and then to 85 copecks per poud; further, the repayment of bounties granted on exportation under the head of loans, has yielded in the year 1886 more than 1½ million roubles.

In order to estimate the influence of the new method of collection of the tax introduced on the 1st August, 1881, and based on the real production of the factories, it is necessary to compare, with the results of 1886 (repayments not included), those of the period between 1876 and 1881, when the system of collecting the tax according to the normal production of the apparatus and the normal yield of the beets, was still in operation. The average result for the six years, 1876-81, is only 4,908,326 roubles, giving for the year 1886 a revenue higher by 14,241,183 roubles. And if it be taken into consideration that the old system of the assessment of the tax gave to the exporters of sugar a disguised bounty of from 50 to 55 copecks per poud, the actual growth of the revenue will be found to be further augmented.

Estimating the population of the Empire at 101,500,000 inhabitants, the tax on sugar would amount to 20·34 copecks per head.

The following statement illustrates the progress of the sugar industry :—

Years.	Number of Factories.	Production.
		Pouds.
1875-76	254	9,507,105
1876-77	260	12,669,594
1877-78	245	10,602,918
1878-79	240	11,101,063
1879-80	239	12,544,628
1880-81	236	12,399,897
1881-82	235	15,936,714
1882-83	237	17,537,890
1883-84	244	18,859,739
1884-85	245	20,958,120
Average for 10 years ..	....	14,211,767
1885-86	241	29,039,594

The plantations of beets which provide the factories with the raw material, extended over an area of 291,730 desiatines in 1884-85 and 299,574 desiatines in 1885-86. The quantity of beets worked was 246,312,380 pouds in 1884-85 and 336,699,730 pouds in 1885-86; the quantity of sugar produced, determined by the excise, was, according to the preceding table, 20,958,120 pouds in 1884-85 and 29,039,594 pouds in 1885-86; moreover, there were 8,427,759 pouds of molasses in 1884-85 and 11,384,582 pouds in 1885-86.

The sugar produced is principally white (25,193,086 pouds in 1885-86, or 86·75 per cent. of the total production).

The quantity of refined sugar produced in the refineries attached to the factories (including that produced in the independent refineries working exclusively raw sugar which has already been subjected to duty in the factories) was 15,199,346 pouds in 1884-85, and 16,762,634 pouds in 1885-86.

The amount of beets taken by the factories in 1885-86 from the 299,574 desiatines under cultivation was 340,881,710 pouds, or on the average 1,138 pouds per desiatine; in 1884-85 the 291,730 desiatines then under cultivation only yielded 249,957,650 pouds, or on the average 857 pouds per desiatine, or a proportion of 32·8 per cent.

The juice extracted from the beet contained, in 1884, 12·63 per cent. of sugar, and in 1885, 12·66 per cent.

The exceptional production of 1885-86 is then solely explained by the abundance of the crop and not by its saccharine richness.

Quantities of beets worked:—

Up to 300,000 pouds	6 factories.
From 300,000 to 600,000 pouds	19 factories.
From 600,000 to 1,000,000 pouds	55 factories.
From 1,000,000 to 2,000,000 pouds	122 factories.
From 2,000,000 to 3,000,000 pouds	30 factories.
More than 3,000,000 pouds	9 factories.

Duration of the working or number of days worked:—

Up to 30 days	1 factory.
From 30 to 45 days	1 factory.
From 45 to 60 days	5 factories.
From 60 to 75 days	16 factories.
From 75 to 90 days	24 factories.
From 90 to 105 days	51 factories.
From 105 to 120 days	61 factories.
From 120 to 150 days	70 factories.
Above 150 days	12 factories.

Quantity of beets worked during one working day:—

Up to 4,000 pouds	6 factories.
From 4,000 to 6,000 pouds	11 factories.
From 6,000 to 8,000 pouds	30 factories.
From 8,000 to 10,000 pouds	31 factories.
From 10,000 to 12,500 pouds	52 factories.
From 12,500 to 15,000 pouds	52 factories.
From 15,000 to 20,000 pouds	38 factories.
From 20,000 to 30,000 pouds	20 factories.
Above 30,000 pouds	1 factory.

Quantity of sugar obtained:—

Up to 25,000 pouds	15 factories.
From 25,000 to 50,000 pouds	45 factories.
From 50,000 to 75,000 pouds	54 factories.
From 75,000 to 100,000 pouds	52 factories.
From 100,000 to 150,000 pouds	56 factories.
From 150,000 to 200,000 pouds	17 factories.
From 200,000 to 250,000 pouds	5 factories.
Above 250,000	1 factory.

In the majority of the factories, diffusion is used for the extraction of the juice; it was used in 1885-86 in 219 factories, possessing 2,716 diffusers of a total capacity of 336,799 vedros; there were only 22 factories working with presses.

The extraction of sugar from molasses is carried on by the three known processes: osmose, elution, and by the action of strontian.

The number of workmen employed was, in 1885-86, more than 90,000 (78,479 men, 12,000 women, and 2,097 children).

The exportation of sugar under the influence of direct bounties of 1 rouble (afterwards reduced to 80 copecks) per poud granted to exporters under the head of loans during the year 1885-86 (from the 12th July, 1885, to the 1st July, 1886,) amounted to 7,582,351 pouds, of which 7,323,932 pouds were exported by the European frontier, and only 258,419 pouds by the Asiatic frontier.

After the 1st July, 1886, when the direct bounties on the exportation of sugar into the European countries were abolished, this export almost ceased on the European side, between the 1st July, 1886, and the 1st January, 1887, 3,939 pouds only being exported on this side; but the exportation by the Asiatic frontier, further stimulated by the continuation of the direct bounties of 80 copecks per poud, rose to 392,656 pouds. The quantity of sugar exported in the course of the year 1886 amounted in the aggregate to 3,871,377 pouds.

The importation of foreign sugar into Russia was very small in 1886, as in previous years; 4,825 pouds only were imported, 252 pouds by the European frontier, and 4,573 pouds by the Asiatic frontier, the latter being principally Chinese candied sugar.

Respecting the present situation of the sugar industry, the following is quoted from the Russian *Herald :—*

"The situation of the Russian sugar industry has considerably improved since manufacturers have formed a syndicate. They have organised at Kiev a central bureau, specially devoted to regulating the prices of sugar, and the results obtained seem encouraging.

"The beet plantations have at the present time an area of 245,825 desiatines, as compared with 223,507 during the 1887-88 season. The average production during the preceding decennial period rose from 950 to 1,100 pouds of beetroots per desiatine. Last year there were produced 254,352,722 pouds of beetroots, or 1,140 pouds per desiatine. As the crop of this year will probably be a medium or good one, it may be fixed approximately at 1,100 pouds per desiatine, or, on 240,000 desiatines, 264 millions of pouds. If the crop should reach 1,140 pouds per desiatine, that will give 273,500,000 pouds of beetroots. On the average, a poud of beets yields 3·53lbs. of sugar. The production of the year 1888-89 should, therefore, be about 24 millions of pouds of sugar. Of this quantity more than 23 million pouds are intended for home consumption."

NOTES ON SACCHARINE.

By Professor G. Bruylants, Louvain University.

(From the *Sucrerie Belge*).

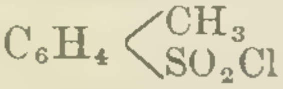
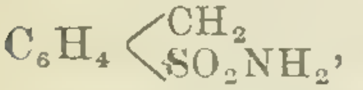
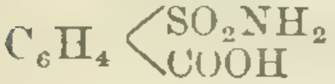
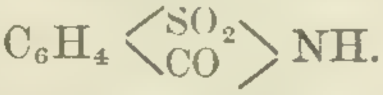
Fahlberg's saccharine, the sweet-tasted product of chemical synthesis, the announcement of which was received with some incredulity, seems to have assumed a definite position as a regular article of commerce.

Discovered in 1879 by Fahlberg and Remsen in the course of some interesting investigations on the oxygenation of sulphamides of the aromatic series, it is now regularly manufactured, and is in the hands of everyone. It is used in confectionery and pastry making, in the preparation of preserves, jellies, fruit syrups, and alcoholic table liqueurs, in the manufacture of wines and beers—in fact, in all our articles of food in which cane and maltose sugar form a part.

It is being used in medicine to give to the food of certain patients an illusionary sweetness, which their treatment would otherwise forbid. It further serves to cover the taste of certain drugs, amongst others alkaloids, with which, thanks to its acid character, it forms salts, the bitterness of which is to a large extent diminished. With it can be partially corrected the bitterness of such alkaloids as strychnine and brucine, which fact may possibly facilitate criminal poisoning with these substances, which has been relatively uncommon owing to their disagreeable taste.

I have now for some time been incidentally occupied in examining this product. My experiments confirm some of the results obtained hitherto, and invalidate some others; and I have decided to submit them to the Academy, mainly because of the importance which this substance threatens to assume in articles of general food consumption, or rather amongst those substances which are used to adulterate our food.

The saccharine of commerce is a white farinaceous powder, presenting under the microscope a rudimentary crystalline appearance; its aqueous solutions deposit, on cooling, needle crystals of various sizes, which appear to belong to the monoclinic system. It melts at about 218°; heated on a platinum plate it diffuses an odour of essence of almonds, and burns without residue. It is sparingly soluble in cold water (one part in 230 at 25°); more soluble in hot water; it dissolves more easily in ether; but entirely in alcohol at 80°.

It is prepared with toluene C_6H_3—CH_3, a hydrocarburet extracted from the lighter tar oils; hence the name of "coal sugar" which has been given to it. The toluene is first treated with concentrated sulphuric acid; during this reaction are formed the ortho and para-toluene sulphonic acids $C_6H_4 \left\langle {}^{CH_3}_{SO_2OH} \right.$ (1·2) and (1·3), which are afterwards transformed into the corresponding ortho and para acid chlorurets  $C_6H_4 \left\langle {}^{CH_3}_{SO_2Cl} \right.$ (1·2) (1·3). The latter is solid, and as it cannot be used for the production of saccharine, it is separated by crystallisation from the liquid ortho-chloruret. In the latter the atom of chlorine is then replaced by the combination NH_2, by treating it with ammonic carbonate, and the amide thus obtained,  $C_6H_4 \left\langle {}^{CH_2}_{SO_2NH_2} \right.$, is oxidised with permanganate of potass, the combination CH_3 becoming COOH. The ortho-sulphamine-benzoic acid  $C_6H_4 \left\langle {}^{SO_2NH_2}_{COOH} \right.$ loses a molecule of water, and gives the anhydrite sulphamine benzoic or saccharine,  $C_6H_4 \left\langle {}^{SO_2}_{CO} \right\rangle NH$.

When saccharine is heated with an excess of caustic potass or soda to a temperature of 250°, salicylic acid is obtained. This reaction has been employed by Schmitt in testing food substances for saccharine.

On adding to saccharine two or three times its volume of resorcine and some drops of concentrated sulphuric acid, and heating the mixture, a reddish colour is produced passing into yellow, which soon changes into dark green, whilst the mass becomes resinous and disengages sulphuric acid. If at this stage the tube is cooled and a little water added with an excess of caustic soda or potass, a liquid is obtained possessing in a high degree the phenomena of fluorescence, it is red by transmission and green by reflection. The mercurial saccharinate also gives this reaction.

Physiological Action.—The marked characteristic of saccharine is a sweet taste of remarkable intensity, which is said to be still perceptible in a solution of 1 gramme to 70 litres of water, but which differs from the taste of sugar in developing more slowly and being followed by a special after-taste.

According to some its sweetening power is 300 times that of cane sugar, according to others 280 times. The greater part of those whom I have caused to taste by way of comparison water sweetened in one case with 12·5 grammes of sugar, in the other with 5 centigrammes of saccharine, found a difference between the two, and considered the latter as the sweetest, which would give to this substance a sweetening power of 250 times that of sugar. Insects distinguish perfectly one from the other; ants, flies, wasps, and especially bees, appear to have an aversion for saccharine.

The different experimenters, Stutzer, V. Adducco, U. Mosso, Salkowski, and Dujardin-Baumetz, admit that saccharine has no action upon the human constitution, and that large doses may be taken without any inconvenience. It is advisable, I think, to distinguish between the immediate action brought about by an isolated dose and that which might be produced by a regular absorption prolonged for a considerable period. Mr. Worms has already noted cases of disagreement with several diabetic patients after being taken some time. What will be the results of saccharine in the food of the general public?

This is a question of the highest importance, for this adulteration is beginning to be practised on a large scale.

It is believed that saccharine passes unchanged into the circulation, that it is completely eliminated in the urine, and that it is not found in any other secretion. These facts, if perfectly established, would tend to prove its harmlessness.

With the intention of examining them, I have made the following experiments:—

1. I have four times taken saccharine and analysed the urine passed during the 24 hours following the dose. The first time the dose was 0·50 gr., the second 1 gr., the third and fourth 1·50 gr. and 2 gr. The alimentation was perceptibly the same in the course of the experiment and during the preceding three days, during which I determined the quantity of sulphur normally found in the urine, employing the following method for testing the quantity of the saccharine:—

To the urine of 24 hours is added a slight excess of chloruret of barium and of caustic barytes, it is then boiled, filtered, and evaporated to dryness. The residue is fully taken up by alcohol at 98°, the alcoholic solution evaporated, and the new residue dissolved in water. Into this solution, heated to 80°, is passed a current of nitrous acid until no more carbonic acid is disengaged. After neutralising the solution with carbonate of potass, it is evaporated, and the residue melted with a mixture of potassic carbonate and nitrate. Then the sulphuric acid formed is weighed in the shape of barytic sulphate.

The results were as follows:—

1st Experiment.—Total sulphur found (1) 0·130 gr.; (2) 0·207 gr.; (3) 0·277 gr.; (4) 0·365 gr. From these figures must be deducted 0·07 gr. of sulphur normally present in the urine. There remain then, (1) 0·060 gr.; (2) 0·137 gr.; (3) 0·207 gr.; (4) 0·295.

Admitting, with Salkowski, that commercial saccharine is a mixture of equal parts of anhydrite-sulphamine-benzoic and of ortho and para-sulphamine-benzoic acids, the following quantities, allowing for the 0·07 gr. of sulphur already existing, ought to have been found:—(1) 0·080 gr.; (2) 0·167 gr.; (3) 0·247 gr.; (4) 0·334 gr.

There are then losses of 20, 18, 16, and 12 per cent. respectively of the saccharine absorbed; these losses would be still greater, if the commercial product were exclusively composed of anhydrite sulphamine benzoic.

2. To a ewe in milk was administered on different days 1, 2, and finally 5 gr. of saccharine without producing any disturbance whatever. The first time the milk contained no saccharine, the second time I found traces of it, and the last time a stronger proportion. The identification was established directly by Schmitt's reaction and by the phenomenon of fluorescence.

Saccharine passes for a very active antiseptic; this quality is constantly insisted on (but erroneously, as we shall see by the following experiments) in advocating its use in beer.

a.—Alcoholic Fermentation.—To beer wort containing yeast were added various quantities of saccharine, and the wort was then left to ferment two days. The intensity of the fermentation was determined by the quantity of carbonic acid disengaged during the period.

In the following figures *a* indicates the wort to which no saccharine had been added; to *b*, *c*, *d*, *e*, *f*, *g*, and *h* were added respectively 1 gr.; 0·50; 0·25; 0·12; 0·05; 0·025; and 0·012 per cent. of saccharine.

The disengagement of carbonic acid was as follows:—

a.	*b.*	*c.*	*d.*	*e.*	*f.*	*g,*	*h.*
300	157	196	220	239	250	270	303 c.c.

From this it results that 1 per cent. of saccharine does not absolutely prevent alcoholic fermentation, whilst a dose of 0·012 gr. per cent. has no effect at all.

β.—Acid Fermentation of Beer.—Different proportions of saccharine were added to various samples of white beer, which were divided into two series, A and B.

To each sample of the A series was added an approximately equal quantity of the ferment found on the surface of sour beer.

The B series was left open to the air without being so impregnated.

A and B acted as standards, and to them no saccharine was added; to A_1 and B_1 was put gr. 0·25; to A_2 and B_2 gr. 0·12; to A_3 and B_3 gr. 0·6; and to A_4 and B_4 gr. 0·3 per cent.

The temperature of the chamber varied between 19° and 21°.

Series A.—At the end of 24 hours A, A_4 and A_3 were covered with a close film almost exclusively consisting of lactic ferment; the development took place more rapidly in A; A_2 was three quarters covered with a blotch consisting of lactic ferment and mother of vinegar. At the end of 48 hours A_2 was completely covered. In A_1 the blotch was considerably developed; it was formed of lactic ferment, with very elongated filaments, and of mother of vinegar. At the end of three days the blotch remained the same, but over the rest of the liquid was spread a film of *micoderma aceti.*

Series B.—At the end of 48 hours numerous blotches appeared on B, and a more limited number on B_4; on the others nothing was visible. After 58 hours B was completely covered with lactic ferment; the blotches on B_4 had increased and developed; they were beginning to show on B_3. At the end of three days the blotches on B_4 and B_3 had not developed any further; they were formed of a mixture of lactic ferment, with very elongated filaments, and of mother of vinegar; but a film exclusively formed of mother of vinegar had spread over the whole of the liquid. At the end of four days the same film covered the liquid in B_2 and B_1.

From this it results that saccharine acts in a different way on lactic ferment and on acetic ferment, and that even in the proportion of 2·5 per 1000 it does not hinder the acid fermentation from developing in beer and rendering it completely sour.

γ Putrid Fermentation.—In a certain number of test tubes were put 5c.c. of culinary gelatine and gr. 0·5; 1; 1½; 2; 2½; and 3 per cent. of saccharine, dissolved in sodic carbonate. Two tubes were reserved as standards without saccharine. All were impregnated with the same quantity of albumen in putrefaction. At the end of two days the development in the two standards was very apparent, nothing could be detected in the others. After four days the two standard tubes were in full fermentation; the development was commencing in tubes 1, 2, and 3. The fifth day a group of organisms showed itself in No. 4. Some days later the gelatine was in full liquefaction in all the tubes, excepting the two last, which have remained unchanged to this day.

A minimum of 2½ per cent. of saccharine is therefore required to prevent the development of putrid fermentation.

Chemical Fermentation.—Digestion by pepsine is only slightly retarded by saccharine, whatever the quantity employed. On the contrary, the pancreatic fermentation is more sensitive; it only takes place slowly in a liquid containing 1 per cent. of saccharine.

This difference perhaps arises from the fact that the pepsine fermentation is carried on with an acid reaction, and that under those conditions only gr. 0·40 per cent. of saccharine enters into solution, whilst the pancreative fermentation proceeds in a neutral solution, which allows a larger proportion of saccharine to become active, transforming it into a salt of soda.

From this it may be concluded that saccharine has no effect on the chemical phenomena of digestion, and that if it causes derangement of digestion, as admitted by Mr. Worms, it must act in an indirect manner.

Saccharine in Beer.—It is known that for some time saccharine has been employed in confectionery, in the manufacture of jellies, of fruit syrups, and alcoholic liqueurs for the table. It seemed interesting to ascertain to what extent it has entered into brewing operations. Beer is an article of prime necessity; it is important, then, to know its adulterations, so as to be able when necessary to put them down.

From last November to March, I analysed 96 samples of various Belgian beers, and found saccharine in three of them; during the latter half of May, and during June, 19 other samples were submitted to analysis, of which four contained saccharine.

* * * * * * * *

The use of saccharine in brewing cannot be put on a level either with the treatment of wines with plaster of Paris, nor of flour with alum, nor the employment of salicylic acid in food substances, nor even with the partial or total substitution of margarine for butter. For saccharine is not susceptible of rendering any service analogous to those rendered by these substances.

Its use cannot be justified by alleging its antiseptic properties. We have seen already, that to prevent the development of the lactic ferment, it would be necessary to add to a hectolitre of beer (which costs on an average 15 francs) 250 gr. of saccharine, the price of which is 30 francs!

At certain times of the year, brewers make use of very large quantities of glycerine; no doubt saccharine would be able to replace this, which would not be an evil; but as it is much more easy to employ, and further, is inodorous, whilst glycerine often has a disagreeable and persistent smell, and, finally, as it possesses an incomparably greater sweetening power, it will soon be employed on a much larger scale, and will serve not only to impart the sweet taste, but also to replace a quantity, more or less great, of the raw material.

Some days ago, I examined a beer which tested 4·1 per cent. of alcohol, 1·82 per cent. of extract containing 0·34 per cent. of glucose; it was syrupy, of the usual sweetness, and contained 30 to 40 milligrammes of saccharine per litre. To impart, by the aid of maltose, the sweet taste which it possessed, 10 to 12 grammes per litre would have been necessary, which would have brought its contents in extract to 3 per cent.

Instead of making beer with the normal quantity of cereals, it is to be feared that this will be reduced as much as possible; which would allow of a great saving in the raw material and in the excise duty. The alcoholic fermentation would be forced, and the saccharine would serve to give body and smoothness.

This product, which passes unchanged through the system, which therefore is not nutritious, will serve largely to adulterate an especially popular article of diet. Thanks to it, unscrupulous manufacturers will be able, to the detriment of the general alimentation, to sell at the same price as now an article of good appearance, but of very inferior nutritive value. The question must be dealt with on the ground of economy, though hitherto we have been contented with treating it solely from a hygienic point of view. When it is a question of nourishment, the economic and the hygienic questions are equally important. It is not sufficient to permit its admixture with our articles of diet, to say or even to prove that it is not injurious.

No doubt up to now it has shown itself completely harmless as regards its immediate effects; I have taken for a tolerably long time without any inconvenience fairly strong doses, as much as three grammes per day, and numerous experimenters have done the same, before me. I have proved that it does not act in any way on chemical fermentations, which means that it does not directly injure the digestive functions, but this does not authorise its introduction into articles of diet in general consumption.

Firstly, it is impossible to judge beforehand of the results of the long continued action of saccharine. And next, even were this question settled in its favour, the addition of it would none the less constitute a fraudulent and reprehensible practice. The question is, in fact, that of replacing an article of diet of a given price by a substance which costs less and is valueless as regards nutritive properties. The addition of saccharine to such articles is intended to give a good appearance to what is of inferior quality; it is unquestionably done with a view of causing deception as to the nature of the article so treated. It is therefore desirable that beers should be more frequently submitted to analysis and closely watched, so that this fraud may be put down. At the least it should be required that beers adulterated with saccharine (or glycerine) should be declared to the public as so treated, as is done in the case of the admixture or substitution of margarine in or for butter.

N.B.—Since the above paper was written, the Belgian Royal Academy of Medicine has nominated, at the request of the Government, a commission to examine the question of the use of saccharine, of which Professor Bruylants forms the corresponding member.

HAWAIIAN SUGAR ESTATES,

With List of Officers and the Number of Labourers Employed on Each.

The following particulars are given in the Report of the Inspector General of Immigrants, made to the Minister of the Interior, May 1, 1888, and laid before the Hawaiian Legislature:—

Island of Hawaii.

Hilea Sugar Co.: H. Center, Manager; E. E. Robbins, Head Overseer; G. S. Patten, Bookkeeper; J. Turnbull, Sugar Boiler; Frank Richards, Engineer. Labourers employed, 168.

Naalehu and Honuapo Plantations: H. Center, Manager; J. Dow, Head Overseer; G. C. Hewett, Engineer; Sam. Center, Sugar Boiler; Charles Binning, Bookkeeper. Labourers employed, 438.

Pahala: D. Foster, Manager; E. W. Fuller, Head Overseer; R. Zeigler, Bookkeeper; J. G. Myhrer, Engineer; E. McDade, Sugar Boiler. Labourers employed, 283.

Waiakea: C. C. Kennedy, Manager; H. Deacon, Bookkeeper; William Chalmers, Head Overseer; T. Forbes, Engineer; A. B. Lobenstein, Sugar Boiler. Labourers employed, 308.

Paukaa: Jona. Tucker, Manager. Cane ground at Papaikou mill. Labourers employed, 90.

Hilo Sugar Co.: J. A. Scott, Manager; W. Scott, Bookkeeper; Robert Sadler, Engineer; H. C. Austin, Sugar Boiler; George Chalmers, Head Overseer at Wainaku, J. Fiddes, Head Overseer at Amaulu. Labourers employed, 482.

Papaikou: J. Colville, Manager; G. E. Whitaker, Bookkeeper; D. Wylie, Head Overseer; Geo. Osborne, Engineer: W. Wright, Sugar Boiler. Labourers employed, 294.

Onomea; Wm. W. Goodale, Manager; C. M. Walton, Head Overseer; Charles E. Kempster, Bookkeeper. Cane ground at the Papaikou mill. Labourers employed, 186.

Pepeekeo: Chung Lung, Manager; H. T. Walker, Engineer; John Robinson, Sugar Boiler. Labourers employed, 281.

Honomu: William Kinney, Manager; H. Scholtzy, Bookkeeper; M. McCann, Engineer; J. Reinhardt, Sugar Boiler. Labourers employed, 253.

Hakalau: Ch. Lehmann, Manager; J. A. Low, Bookkeeper; J. Chalmers, Head Overseer; C. Horswill, Engineer; H. Wilgeroth and F. H. Kaapa, Sugar Boilers. Labourers employed, 398.

Laupahoehoe Sugar Co.: J. M. Lydgate, Manager; A. C. Palfry, Bookkeeper; Colin McLennan, Head Overseer; S. Taylor and John Dickson, Engineers; E. W. Barnard and J. Reinhardt, Sugar Boilers. Labourers employed, 356.

Waipunalei: Thomas Hind, Manager. Cane ground at Laupahoehoe mill. Labourers employed, 66.

Ookala: J. N. Wright, Manager; G. Theker, Head Overseer; J. B. Hopkins, Bookkeeper; H. Kruger, Sugar Boiler; J. Cushingham, Engineer; J. Thompson, Blacksmith. Labourers employed, 176.

Kukaiau: J. M. Horner, Manager; A. Horner, Head Overseer;

Miss Annie Horner, Bookkeeper. Cane ground by the Kukaiau mill. Labourers employed, 170.

Kukaiau Mill Co.: G. F. Renton, Manager; W. Brede, Engineer; E. Madden, Sugar Boiler. Labourers employed, 48.

Hamakua Mill Co.. J. R. Renton, Manager; H. Rodgers, Engineer; Thomas Hughes, Sugar Boiler. Labourers employed, 41.

Hamakua Plantation Co.: A. Lydgate, Manager. Cane ground at the Hamakua mill. Labourers employed, 203.

Paauhau: A. .Moore, Manager; J. Watt, Head Overseer; C. Bragg, Bookkeeper; L. W. Toms, Engineer; W. Peterson, Sugar Boiler. Labourers employed, 306.

Honakaa: William H. Rickard, Manager; H. T. Broderick, Bookkeeper; H. S. Rickard, Head Overseer; A. Kidd, Engineer; A. de Breteville, Sugar Boiler. Labourers employed, 202.

Honakaa: W. H. Rickard, Planter; R. T. Rickard, Overseer. Cane ground at the Honokaa mill. Labourers employed, 51.

Honokaa: R. M. Overend, Planter. Cane ground at the Honakaa mill. Labourers employed, 70.

Honokaa: J. Marsden, Planter. Labourers employed, 18.

Kukuihaele: W. H. Purvis & Co., Planters; C. D. Miller, Bookkeeper; J. Melanphy, Head Overseer. Cane ground at the Pacific Sugar Mill. Labourers employed, 205.

Kukuihaele: J. M. Horner and Sons, Planters. William Horner, Manager. Cane ground at the Pacific Sugar Mill. Labourers employed, 160.

Kukuihaele: Pacific Sugar Mill. C. von Mengerson, Manager; S. Jatho, Engineer; H. Schultz, Sugar Boiler. Labourers employed, 50.

Hawi: John Hinds, Manager; William McKim, Head Overseer; John Hinds, Bookkeeper; Robert Valentine, Engineer. Labourers employed, 191.

Beecroft Plantation Co.: H. R. Bryant, Manager. Cane ground at the Hawi mill. Labourers employed, 78.

Union Mill: James Renton, Manager; H. H. Renton, Assistant Manager and Bookkeeper. Labourers employed, 73.

Puehuehu Plantation Co.: Kynnersley Brothers, Planters. Robert Wallace, Manager. Cane ground at the Union Mill. Labourers employed, 95.

Star Mill: J. Hinds, Manager; G. H. Williams, Assistant Manager; E. C. Bond, Bookkeeper; J. Leech, Engineer; Moses Kennedy, Sugar Boiler. Labourers employed, 137.

Kohala: C. A. Chapin, Manager; W. J. Wright, Bookkeeper; W. P. McDougall, Head Overseer; J. F. Colay, Assistant Overseer; J. N. Blaisdell, Sugar Boiler; C. F. Phelps, Engineer. Labourers employed, 338.

Halawa Sugar Co.: C. B. Wells, Manager;* C. J. Falk, Bookkeeper; H. Streubeck, Engineer; H. M. Alexander, Sugar Boiler. Labourers employed, 78.

Akina & Aseu, Planters: Cane ground at the Niulii mill. Labourers employed, 88.

Niulii: Robert Hall, Manager; Emil Bader, Head Overseer; T. R. Mossman, Bookkeeper; Peter Born, Engineer; G. E. Bryant, Sugar Boiler. Labourers employed, 179.

Island of Maui.

Hana: David Center, Manager; P. McLane, Head Overseer; J. F. McKenzie, Bookkeeper; John Neil, Engineer; J. M. Davidson, Sugar Boiler. Labourers employed, 250.

Reciprocity: P. M. Rooney, Manager; Dan. Quill, Head Overseer; A. Irvine, Bookkeeper; —— ———, Sugar Boiler; Thomas P. Lowther, Engineer. Labourers employed, 243.

Muulea: A. M. Sproull and G. Irvine, Planters. Cane ground at the Reciprocity Mill. Labourers employed, 27.

Kipahula: Oscar Unna, Manager; W. Von Uffel, Bookkeeper; A. Gunning, Head Overseer; E. Baskerville, Engineer; H. Muller, Sugar Boiler. There are no labourers under contract in this plantation. Labourers employed, 117.

Waikapu: W. H. Cornwell, Manager; E. B. Friel, Bookkeeper; E. A. Morris, Sugar Boiler; Joe. Crockett, Head Overseer. Labourers employed, 165.

Wailuku: R. D. Walbridge, Manager; H. H. Plemer, Head Overseer; H. B. Wentworth, Engineer; A. Barnes, Bookkeeper; W. A. Bailey, Sugar Boiler. Labourers employed, 213.

Hamakuapoko: H. P. Baldwin, Manager; Warren Goodale, Bookkeeper; J. Cowan, Engineer; R. T. Wilbur, Sugar Boiler; G. Gilhus, Clerk. Labourers employed, 456.

East Mauhi (Kaluanui): W. Von Graevermeyer, Overseer. Cane ground at the Hamakuapoko Mill. Labourers employed, 52.

Paia: E. M. Walsh, Manager; L. F. Carleton, Head Overseer; H. Laws, Bookkeeper; F. S. Armstrong, Sugar Boiler; Thomas Campbell, Engineer. Labourers employed, 483.

Spreckelsville: H. Morrison, Manager; W. G. Walker, Head Overseer; Phil. Mondt, Cashier; Geo. Ross, Bookkeeper; J. H. Stelling, Assistant Bookkeeper; F. Moore, Engineer; H. Antonsen, Sugar Boiler. Labourers employed, 1,298.

Waihee: P. Norton Makee, Manager; Geo. C. Potter, Head Overseer and Bookkeeper. Labourers employed, 189.

Huelo: Wm. Turner, Manager; Everett Brumaghin, Bookkeeper; J. K. Smith, Engineer; J. A. Rodney, Sugar Boiler. Labourers employed, 190.

Olowalu: Aug. Haneberg, Manager; W. Fecola, Head Overseer; F. Earnest Hartmann, Bookkeeper; W. Heine, Engineer and Sugar Boiler. Labourers employed, 155.

W. Y. Horner & Sons, Planters: W. Y. Horner, Manager; C. F. Horner, Head Overseer; W. Y. Horner Jr., Bookkeeper. Cane ground at the Pioneer Mill. Labourers employed, 300.

Pioneer Mill: F. S. Dunn, Manager; W. Ebeling, Sugar Boiler; C. Rosse, Bookkeeper. Labourers employed, 66.

Island of Oahu.

Waianae: A. Ahrens, Manager; Wm. Arnemann, Head Overseer; Carl Arnemann, Sugar Boiler; A. K. Hapai, Bookkeeper; John Wright, Engineer. Labourers employed, 277.

Laie: William King, Manager. There are no contract labourers on this plantation. Labourers employed, 80.

Waialua: R. Halstead, Manager; E. Halstead, Head Overseer; F. Halstead, Sugar Boiler; A. Hastings, Engineer. Labourers employed, 171.

Makaha: F. Bucholtz, Manager. Cane ground at Waianae Mill. Labourers employed. 40.

Kaneohe: M. Rose, Manager. Cane ground at Heeia Mill. Labourers employed, 74.

Waimanalo: John A. Cummins, Manager; James Merseberg, Bookkeeper; W. H. Pond, Engineer; J. O. Dowda, Sugar Boiler; Moses Hiram, Engine Driver. There are no labourers under contract on this plantation. Labourers employed, 337.

Heeia: J. T. Downey, Manager; S. S. Manheim, Bookkeeper; W. McGowan, Sugar Boiler; F. Scott, Engineer. Labourers employed, 198.

Island of Kauai.

Kekaha: Otto Isenberg, Manager; F. W. Glade, Head Overseer and Bookkeeper; C. Bosse, Engineer. Labourers employed, 150.

Kekaha: Meier & Kruse, Planters. Cane ground at the Kekaha Mill. Labourers employed, 188.

Mana: H. P. Faye & Co., Planters. Cane ground at the Kekaha Mill. Labourers employed, 59.

Princeville: C. Koelling, Manager; J. C. Long, Head Overseer; C. Tuch, Sugar Boiler; M. Hopfe, Engineer. Labourers employed, 145.

Waimea: W. D. Schmidt, Manager; John Fassoth, Engineer; J. Rahe, Sugar Boiler. Labourers employed, 84.

Eleele: A. Dreier, Manager; H. Dorlmund, Head Overseer; J. Thompson, Engineer; H. Weber, Sugar Boiler; R. Poppe, Bookkeeper. Labourers employed, 222.

Koloa: Anton Cropp, Manager; Louis Kahlbaum, Head Overseer; M. Richter, Bookkeeper; G. Goodacre, Sugar Boiler; F. Loeha, Engineer. Labourers employed, 416.

Grove Farm: George N. Wilcox, Owner; Louis Ahlborn, Manager. Cane ground at the Lihue Mill. Employs no contract labourers. Labourers employed, 86.

Lihue: Carl Isenberg, Manager; C. H. Bishop and W. Grote, Sugar Boilers; J. Wilcox and H. Kellner, Engineers; C. Wolters, Bookkeeper; P. R. Isenberg Overseer. Labourers employed, 401.

Hanamaulu: A. S. Wilcox, Manager; ——— ———, Bookkeeper. Labourers employed, 223.

Kealia: Z. S. Spalding, Manager and President; William Blaisdell, Assistant Manager; G. H. Dole, Manager at Kapaa; John Sherman, Engineer; F. Riedel, Sugar Boiler; W. G. Smith, Timekeeper; R. C. Spalding, Bookkeeper and Cashier. Labourers employed, 1,030.

Kilauea: R. A. Macfie, Jr., Manager; R. L. Auerback, Bookkeeper; Ed. Macfie, Engineer; E. Muller, Sugar Boiler. Labourers employed, 263.

A. H. Smith & Co., Planters: Jared K. Smith, Manager. Cane ground at Koloa Mill. Labourers employed, 56.

Kaluahonu Co., Planters: E. E. Conant, Manager. Cane ground at the Koloa Mill. Labourers employed, 14.

Makaweli: Gay & Robinson, Planters: F. Gay, Aubrey Robinson, Managers. Cane ground at the Waimea Mill. Labourers employed, 130.

ISLAND OF MOLOKAI.

Kamalo: J. McColgan & Co.; D. McCorriston, Manager; George Temple, Sugar Boiler. Labourers employed, 32.

ELECTRIC SUGAR REFINING CO.—NEW YORK'S DEMONSTRATION, SEPTEMBER 7, 1888.

Report of Messrs. Willett, Hamlen & Co., taken from their *New York Circular* of September 13, 1888:—

The machinery of this refinery was sufficiently advanced towards completion to allow of a preliminary demonstration in the presence of several gentlemen, to which we were invited. Raw sugar passed into a secret room containing the refining apparatus, from thence it passed into a secret room on the floor below containing the granulators, from whence it passed in a completely refined state through spouts into barrels on the floor below. We saw the raw sugar and the refined, but not the progress of the transition through the secret rooms, although we heard the machinery in full operation, and can say that the refined sugar came into the barrels direct from some machine, in three different grades of apparently quite fresh manufacture—the time occupied from the starting of the raw to the appearance of refined being 25 minutes, and a barrel being filled regularly every two minutes when in full operation. About thirteen barrels of refined were thus produced, when the trial ended, in consequence of injury to the machinery. In addition to the three grades mentioned, eight other grades were made at this trial, and by subsequent private trials by the operator. We understand grades can be made and changed by changing plates in the granulators. The eleven grades now shown represent all grades of hard refined, from powdered to blocks of large size, many of the grades, if not all, being quite unlike sugar of the regular refineries—some experts saying that some of the grades could not possibly have been made by the process of melting raw sugar in use by refiners. The "Electric" Company's process claims to be "a dry process throughout, dispensing altogether with boiling and the use of bone-black. No syrup whatever is produced; but the whole product is hard sugar of nearly, if not quite, absolute purity, namely, 100 per cent. cane sugar, as per analysis." . . . "Raw sugar of the lowest grade can be converted as easily as the highest grade, and within 1 per cent. of the whole saccharine matter, whether cane or 'invert,'" and all at a minimum cost of refining. The importance of these claims, and the evidence of their fulfilment being thus far limited to the view of the sugars produced, and not to any permitted examination of the secret machinery or secret rooms, to guard against deception, the public are slow to believe in them as realities completed and about to revolutionise the refining business. Nevertheless, it must be said that these samples, until duplicated by other refiners by their own processes, go far to prove that a new process of refining is in the possession of this company—and this is now freely admitted by many experts. Much anxiety will continue to exist until the company have completed their machinery, and have actually produced the same sugars in a sufficiently large quantity to satisfy the most sceptical. This is promised during the coming month."

The Financial News, a paper which has given considerable prominence to this electric sugar movement, states, in its issue of September 12th, that:—

"We learn from New York that the new Electric Sugar Refining process is an established success, and no further experiments are deemed necessary. The effect of this new discovery upon the sugar trade has already been described in these columns, and its introduction into England will be awaited with profound interest."

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. Thompson, C.E., F.C.S., M.I.M.E., Patent Agent, 6, Lord Street, Liverpool; 6, Bank Street, Manchester; and 323, High Holborn, London.

ENGLISH.

APPLICATIONS.

12784. B. E. R. Newlands, London. *Improvements in means or apparatus for drying slabs of sugar, applicable for heating and cooling other articles, and for analogous purposes.* 4th September, 1888.

13084. G. Adant, London. *Improvements in the manufacture of sugar and in apparatus therefor.* 10th September, 1888.

13129. O. Bluhme, London. *Improvements in and relating to the filtration of beet-root juice in the process of making beet-root sugar, and in the after utilisation of the filtering material after filtration has been effected.* (Complete Specification.) 11th September, 1888.

ABRIDGMENTS.

13102. John George Hudson, of the firm of Messrs. Merilees, Watson & Co., Scotland Street Iron Works, Tradeston, in the Counties of Lanark and Renfrew, North Britain, Engineer. *Improvements in sugar mills.* September 28th, 1887. This invention provides a means and apparatus for applying spring pressure on the top roller of a cane crushing mill, in such manner that it shall yield to a certain extent to allow for irregularities in the material under treatment. Three ways of carrying out this invention are shown, differing chiefly in the number and manner of applying the springs. The same principle is observed throughout, that is, applying pressure upon the upper journals of the roller by means of a volute spring through the agency of elbowed levers. In the first case, two such levers (or toggles) are used on each journal, and the volute springs employed, constantly tend to force together the elbows of same, thus straightening them and (as their top parts abut against an adjustable cross piece), force down their lower ends, and with them the journal thus apply the desired pressure. In the second modification, the springs rest against the elbows by means of separate levers, and in the third case, each elbowed piece has a right angled web projecting outwardly, and the springs tend to force same together. It is to be observed that in each case the action of the parts is such that when the springs are least compressed and therefore exerting their least pressure, they are acting at the greatest mechanical advantage or leverage, and *vise-versa.*

14164. G. Fletcher, Litchwich, Derbyshire. *Improvements in the evaporation and concentration of sugar cane juice and other liquids and apparatus therefor.* 18th October, 1887. This invention relates to the evaporation and concentration of sugar cane juice, and other liquids by the aid of steam, air or fire, in either open or closed vessels, under vacuum or pressure or ordinary atmospheric conditions; it relates, however, more particularly to the working of vacuum pans and effets. The object of the invention is to accelerate the circulation of the liquids treated in the evaporators or concentrators, and thus enable evaporation to take place under the most favourable conditions. In order to accomplish this design, an effet vessel having a treating chamber or drum, with a large tube and a number of smaller tubes fixed in the tube plates is employed. The large tube is the circulation tube, and the smaller ones are the treating tubes. These tubes contain the liquid to be treated, the steam or vapour being on the outer surface of the tubes. The bottom cover of the vessel carries a vertical revolving spindle having a screw propeller fixed thereon, this screw as it revolves forces the liquid contained in the large tube towards the lower end, whence it passes out and ascends through the treating tubes, the liquid displaced in the large tube being replaced by liquid in the upper part of the tube. In this way a constant and regular circulation of the liquor is ensured and an excellent effect obtained from the treating surface in the vessel. Thus by employing these mechanical means to assist and accelerate the imperfect circulation produced by reason of the difference in specific gravity of the more treated and the cooler liquids a complete and rapid circulation is ensured.

9775. C. Steffen, Vienna, and C. F. Langen of the firm of F. Langen and Hundhausen, of Grevenbroich, Germany. *An improved process for rapidly refining sugar in loaf form through the combined systematic or simple purification of the loaves with pure liquor within the form under pressure, subsequently driving off the superfluous liquid, and regaining the same by means of the centrifugal apparatus, and the apparatus for carrying the process into effect.* 5th July, 1888. The object of the present process is to purify sugar loaves with liquor under pressure, in partially or entirely systematic manner, and to rapidly remove and regain the pure liquor contained in the sugar loaf. It consists in: 1. The rapid treatment of loaf sugar characterised by the combination of the systematic or simple washing of loaf sugar within the loaf forms under pressure, with the centrifuging of the washed or purified mass of sugar in appropriate centrifugal machines, for driving off and regaining the pure washing liquor passing off from the purified sugar loaves; and 2. In driving off the pure washing liquor out of the apparatus, and the loaf forms when the process is finished by means of compressed air.

AMERICAN.

ABRIDGMENT.

384772. Thomas Makemson, of Mound City, Kansas. *Evaporating pan.* June 19th, 1888. This inventor provides an inner pan or pans (supported in the ordinary pan on legs or slotted division plates), which will receive the partly evaporated or thick liquor, and thus prevent direct contact with the outer heated surface, and consequent burning.

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

TABLE SHOWING THE CONSUMPTION PER HEAD IN THE PRINCIPAL COUNTRIES OF THE WORLD.

(Drawn by Mr. A. E. Bateman, April 9th, 1888.)

	1880-84.* Per Head. Hds.		1887.† Per Head. Hds.
Finland	1·32	....	..
Roumania	3·30	....	..
Servia	4·41	....	..
Spain	5·11	....	..
Italy	7·59	....	..
Russia	7·71	....	9·03
Portugal	9·56	....	..
Norway	11·57	....	..
Austria-Hungary	13·22	....	12·11
Germany	15·00	....	18·94
Belgium	15·73	....	..
Sweden	17·81	....	..
France	22·60	....	27·09
Switzerland	22·80	....	..
Netherlands	28·35	....	23·13
Denmark	29·67	....	..
Great Britain	68·94	....	70·48
United States	38·11	....	61·01
Argentine Republic	..	....	50·00‡

Mr. Bateman gives the consumption per head in kilogrammes, which we have converted into their equivalents in English pounds.

The increase in the United States since 1884, as here shown, is enormous, about 57½ per cent.; this however, is manifestly incorrect,—taking the population in 1887 at 58 millions and the consumption at 1,300,000 tons (an outside figure) it comes out not quite 50 lbs. per head.—Ed. *S. C.*

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* From figures given by Mr. Broch.

† From figures given by Messrs. Counal, of Glasgow.

‡ From the figures given by United States' Consul Baker, January, 1888.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

January 1st to August 31st, 1887-1888.

Board of Trade Returns.

IMPORTS.

Raw Sugars.	Quantities.		Value.	
	1887.	1888.	1887.	1888.
	Cwts.	Cwts.	£	£
Germany	4,195,155	2,974,059	2,272,854	1,936,581
Holland..................	311,221	209,515	168,508	134,536
Belgium	537,162	423,412	283,636	270,885
France	29,460	10,255	17,483	7,075
British West Indies & Guiana	1,891,706	1,775,896	1,326,684	1,412,245
British East Indies	234,009	939,053	106,512	453,372
China and Hong Kong	312	4,080	201	2,420
Mauritius	95,540	152,682	51,860	105,715
Spanish West India Islands	162,198	304,376	100,390	223,412
Brazil	582,479	2,104,154	306,270	1,322,650
Java	2,634,550	3,038,206	1,709,526	2,286,185
Philippine Islands	272,825	413,431	123,365	201,525
Peru	265,125	345,110	161,945	254,496
Other Countries	361,763	468,721	204,578	337,604
Total of Raw Sugars ..	11,573,505	13,162,950	6,833,812	8,948,701
Molasses	240,291	290,857	77,132	89,137
Total Sugar and Molasses	....	....	6,910,944	9,037,838
Refined Sugars.				
Germany	1,760,997	2,055,573	1,343,388	1,792,689
Holland..................	948,879	928,290	733,850	842,279
Belgium	130,150	136,600	107,329	130,164
France	1,045,382	538,995	783,776	492,137
United States	760,211	39,953	607,939	37,207
Other Countries	55,377	382,991	39,745	304,276
Total of Refined	4,700,996	4,082,402	3,616,027	3,598,752

EXPORTS.—Refined Sugars.

	Cwts.	Cwts.	£	£
Sweden and Norway	45,282	50,934	31,365	42,328
Denmark	76,173	58,094	42,381	42,607
Holland	45,897	55,586	30,158	40,755
Belgium	27,341	19,204	16,537	13,656
France	25,107	4,229	15,577	2,896
Portugal, Azores, & Madeira	57,916	51,002	33,357	37,462
Italy	56,230	59,204	34,872	43,759
Other Countries	123,499	116,156	83,393	92,536
Total of Refined	457,445	414,409	287,640	315,999

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of August, 1888, compared with the corresponding month of the two preceding years, and the average monthly imports for the year compared with those of 1885, 1886, and 1887, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

Countries from which Sugar has been imported.	"Lumps and Loaves."							"Other Sorts." Including Crushed Loaf, Granulated, Crystallized, &c.							Total.						
	Monthly Average.				Aug.	Aug.	Aug.	Monthly Average.				Aug.	Aug.	Aug.	Monthly Average.				Aug.	Aug.	Aug.
	1885	1886	1887	1888	1886	1887	1888	1885	1836	1887	1888	1886	1887	1888	1885	1886	1887	1888	1886	1887	1888
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
France	1597	1462	1363	1756	1357	2020	1362	463	2688	5099	1612	2989	5183	1401	2060	4150	6462	3368	4346	7203	2763
Holland	3848	3508	3780	3272	4042	3272	4326	1472	1428	2483	2529	1839	2236	2399	5320	4936	6263	5801	5881	5508	6725
Germany & Austria	808	990	1347	1480	1228	784	1329	3262	6634	10463	11367	7214	6998	7962	4070	7624	11810	12847	8442	7782	9291
Belgium	189	344	592	624	293	574	674	120	113	308	230	96	202	143	309	457	900	854	389	776	817
United States	707	854	454	12	1088	394	..	8869	5078	2804	238	8942	1393	20	9576	5932	3258	250	10030	1787	20
Russia	..	..	3	..	..	..	..	875	3412	452	2392	..	1448	3688	875	3412	455	2392	..	1448	3688
Other Countries	1	..	..	1	..	..	..	24	9	15	..	..	..	..	25	9	15	1	..	..	..
Total	7150	7158	7539	7145	8008	7044	7691	15085	19362	21624	18368	21080	17460	15613	22235	26520	29163	25513	29088	21504	23304

SUGAR STATISTICS—GREAT BRITAIN.

To September 22nd, 1888 and 1887. In Thousands of Tons, to the nearest Thousand.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1888.	1887.	1888.	1887.	1888.	1887.
London	53	62	225	227	224	213
Liverpool	117	80	234	195	267	198
Bristol	1	3	37	44	34	44
Clyde	25	38	183	169	165	171
Total	196	183	679	635	690	626
	Increase	13	Increase	44	Increase	64

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

For the four principal Ports. In Thousands of Tons, to the nearest Thousand. For August, 1888 and 1887.

	STOCKS. September 1st.		DELIVERIES. In August.		IMPORTS. In August.	
	1888.	1887.	1888.	1887.	1888.	1887.
New York	69	137	74	70	46	60
Boston	10	15	17	17	17	14
Philadelphia	3	2	21	18	19	14
Baltimore	..	..	..	..	..	..
Total	82	154	112	105	82	88
	Decrease	72	Increase	7	Decrease	6
Total for the year (1888)			758	827	791	878

Stocks of Sugar in the Chief Markets of Europe on the 31st August, for Three Years, in thousands of tons, to the nearest thousand.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts*.	Total 1888.	Total 1887.	Total 1886.
234	103*	6	35*	20	17	415	425	542

*Estimate.

Consumption of Sugar in Europe for Three Years, ending 31st August, in thousands of tons, to the nearest thousand.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts*.	Total 1888.	Total 1887.	Total 1886.
1242	424	44	420	229	344	2703	2673	2420

Estimated Crop of Beet Root Sugar on the Continent of Europe for the present Campaign, compared with the actual crop, of the three previous Campaigns.

(From Licht's Monthly Circular.)

	1888-89. Tons.	1887-88. Tons.	1886-87. Tons.	1885-86 Tons.
France	500,000	391,258	486,443	298,407
German Empire	1,025,000	941,323	1,018,842	838,131
Austro-Hungary	600,000	408,565	523,060	377,032
Russia and Poland	475,000	430,000	479,582	537,860
Belgium	137,500	135,000	132,570	88,421
Holland	45,000	36,000	32,263	21,244
Other Countries	67,500	56,050	56,050	55,500
Total	2,850,000	2,398,196	2,728,810	2,216,595

As compared with Mr. Licht's estimate, last month, for 1888-89, his present figures shows an increase of 125,000 tons, as follows: France, 55,000 tons; Germany, 35,000 tons; Austria, 25,000 tons; Russia, 25,000 tons; Holland, 2,000 tons; other Countries, 5,500 tons. On the other hand he reduces his estimate for Belgium by 22,500.

Mr. Görz estimates the present crop at 2,660,000 tons, or 190,000 tons less than Mr. Licht's estimate.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

During the first three weeks of August a large business was done in sugar in this market, and prices advanced from 6d. to 9d. per cwt.; prompt beet 88%, which at the commencement of the month stood at 14s. 3d., rose to 15s.

The publication last week of Mr. Licht's revised estimate of the next European beet crop, raising the total by 125,000 tons, has unsettled the market, and beet has fallen 9d. per cwt. It is worthy of note that Mr. Görz estimates the crop at 190,000 tons below that given by Mr. Licht. Prompt beet 88% is now 14s. 3d.; October, 13s.; November and December, 12s. 9d. All descriptions of cane grown maintain their price, the supply being much reduced.

A frightful hurricane visited Cuba on the 4th and 5th of last month, and the loss of life and property on the north side of the island is terrible. The damage done to the sugar crop is variously estimated from 10 to 20 per cent.

The imports of foreign refined for August, 1888, were 23,314 tons, against 24,504 tons in August, 1887. The total for the eight months of 1888, as compared with 1887, show a falling off of 30,351 tons.

The deliveries of sugar into the United Kingdom from 1st January to 22nd September, as compared with the same period of 1887, show an increase of 44,027 tons, and the imports an increase of 64,402 tons.

The stocks of sugar in the United Kingdom on September 22nd were 196,048 tons, against 182,563 tons in 1887, or an increase of 13,485 tons.

Present quotations for the standard qualities, as under, are :—

Floating.			Last Month.
Porto Rico, fair to good Refining	13/6 to 14/–	against	14/-
Cuba Centrifugals, 96°/o polarization	16/-	,,	15/6
Cuba Muscovados, fair to good Refining	13/6 to 14/-	,,	13/6
Java, No. 15 to 16, good to strong	16/6 to 17/-	,,	16/- to 16/6.

Landed.			Last Month.
Madras Cane Jaggery	9/3 to 9/6	against	8/9 to 9/-.
Manila Cebu and Ilo Ilo	9/- to 9/6	,,	8/9 to 9/-.

Paris Loaves, f.o.b.	18/6 to 18/9	against	18/9 to 19/-.
Titlers	19/9	,,	20/6
Tate's Cubes	21/6	,,	22/3
Austrian-German Beetroot, 88°/o f.o.b.	14/3	,,	14/6

THE

SUGAR CANE.

No. 232. NOVEMBER 1, 1888. Vol. XX.

☞ The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to Henry Thorp, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see page iii.

Sir Charles Cameron Lees, Governor of Barbados, and Sir William Robinson, Governor of Trinidad, have both returned to the West Indies, after a brief visit to this country.

Sir John Pope Hennessy will not leave England to resume his duties as Governor of Mauritius until December 1st. He will return again to this country in June next year.

It is with regret that we have to record the sudden death on the 9th ultimo., at Brisbane, of Sir Anthony Musgrave, the Governor of Queensland. Sir Anthony, born in 1828, began life as private secretary to Mr. William Mackintosh (son of the historian and politician, Sir James Mackintosh), when Governor-in-Chief of the Leeward Islands, 1851-2. He has been governing colonies, great and small, since 1860, and was just on the point of retiring with the object of settling at New York, among the relations of his second wife, the present Lady Musgrave, who was a daughter of David Dudley Field, and a niece of Cyrus Field. Sir Anthony Musgrave was the last Lieutenant-Governor of British Columbia upon its absorption in the Dominion of Canada, June, 1869, and he was transferred thence to Natal, where he had a stormy but brief reign, principally passed in a financial crisis due to a fit of economy on the part of the Legislature. His subsequent terms of office in South Australia and Jamaica were unruffled, as were also his earlier years in Queensland, whither he was transferred in 1883. Latterly, he has had delicate and difficult work to do in presiding over the mixed forces which rule the destinies of New Guinea, and his last days have been darkened by the quarrel mentioned in the *Sugar Cane* last month, page 516, between him and his Ministry on a question of pardoning a criminal. It is not known, says the correspondent of the *Glasgow Herald*, whether the chagrin attending the adverse decision of Lord Knutsford in that case hastened his end, but, having regard to his somewhat choleric disposition, it is not at all unlikely that it did so.

A large proportion of our present number is taken up with correspondence on the Sugar Convention. Sir T. H. Farrer returns to the charge, and Messrs. N. Lubbock, G. Martineau, and George Shute meet him on his own ground.

All our statesmen, without exception, admit that the system of bounties is bad, and now that all the beet sugar producing countries of Europe, with the exception of France, are willing to put an end to bounties, it is plainly the duty of our Government to aid them.

Should France persist in holding aloof from the Convention, the result would be that her sugars would be shut out from the British market. What does this mean? If we look to the figures, we shall find that it is not so serious as at first sight it appears. Take the year from October, 1887, to September, 1888. The total European beet sugar production was 2,400,000 tons, of which France contributed not quite 400,000 tons; of this 2,400,000 tons, 685,296 tons raw and refined were exported to this country. The French exports of raw and refined were only 42,173 tons, or a little over 6%.

It is argued that to exclude French sugars would have the effect of raising prices on our market—which seems to us absurd. The excluded sugars would probably find a market in the United States; and if so, it would liberate an equal amount of sugar for our own market, which would otherwise have gone to the United States, and so the thing would balance.

It may be argued—and we do not say that there is nothing in it—that if our Government excludes French sugars, it may create what might be a difficulty, when the time arrives for the renewal of the present commercial treaty with France. The difficulty, if it should prove one, is not insurmountable.

Mr. Jos. Görz, of Berlin, the well-known and experienced engineer and statistician, who edits the *Wöchentlicher Marktbericht* (Weekly

Market Report), which is attached to the *Deutsche Zucker Industrie*, has published a pamphlet of 68 pages, entitled "Einige Worte zur Beleuchtung der Londoner Convention zur Abschaffung der Zuckerprämien" (A few words with the object of throwing light upon the London Convention for abolishing the sugar premiums). In this *brochure* he discusses the premiums, the Congress, and its outcome—the Convention; the consequences of the Convention, and the course to be adopted by the beetroot sugar manufacturers in the event of the Convention coming into force.

While we cannot by any means agree with all the statements and deductions of Mr. Görz, the ability and thoroughness with which the questions are discussed, and the remarkable nature of the course of action which he considers will have to be taken by the beet sugar producing nations, are such that we gladly reproduce in the present issue (see page 605) a portion of the pamphlet, and may possibly eventually give much of the remainder in future numbers. Fas est ab hoste doceri, Mr. Görz seems, unlike Mr. Herbert, to regard the cane as the natural enemy of the beet, rather than a friendly competitor in a field where there is room for both to exist.

The *Journal des Fabricants de Sucre* speaking of the London International Convention, says:—

Our confrère, Mr. J. Görz, has communicated to us the resolution adopted on the 19th inst. at the meeting of sugar manufactures, held at Halle A/S.

The Convention concluded at London, on the 31st August last, for the suppression of sugar bounties, seems made primarily in the interests of the English colonies and English refiners. In addition to this it is a measure directed against the interests of the beetroot sugar industry, inasmuch as by abandoning the principle of the tax on the raw material, which has had such excellent results, it is desired to subject the sugar industry to a fiscal régime, which, applied to the beetroot sugar manufactures, will constantly produce for the latter irreparable consequences as regards the struggle with cane sugar in the world's market. Besides this, the Convention both in itself, and owing to the fact that it has not been agreed to by all the sugar producing countries, is unfitted to procure for the industry the quiet and stability necessary for its development and its prosperity.

The Branch Association of sugar manufacturers, assembled at Halle, the 19th October, declares uanimously that it does not approve the line of conduct followed by the *Deutsche Zucker Industrie*, with regard to the Convention, and that it does not consider it reconcilable with the interests of the German manufacturers.

We have nothing further, that is definite, to report respecting "Electric Sugar." A *public* "demonstration" was announced to take place in New York on October 20th.

The *Financial News*, which reported, the following day, the result of the demonstration of September 7th, and had a leader upon it, has made no allusion to the demonstration which was to take place on October 20th. We notice, however, that the shares quoted in that paper, immediately before October 20th at 100, are now (31st) 85. The nominal capital of the Company is $1,000,000, in 10,000 shares of $100 each.

Mr. Sylvanus P. Thompson, in a letter to the *Times* of October 2nd, upon electrically refined sugar, says:—

To the Editor of the "Times."

Sir,—In these days, when the mere prefixing of the word "electrical" to a process or invention is sufficient to attract attention on the Stock Exchange and in the public Press, it may not be unimportant to point out that the persons who have introduced into this country samples of sugar refined by the method devised by the late Mr. Friend, of New York, have produced no evidence whatsoever that electricity has anything to do with the process. The chemistry of sugar refining is briefly this—that the syrup requires to be partially oxidised, and strained or filtered to free it from impurities. Far be it from me to deny that oxidation can be effected by electric discharges. Granted that this can be done as a matter of experimental science, there still remain three questions—Can the process be made a commercial one? Is such a process cheaper than the older chemical processes for attaining the same end? Lastly, but not of least moment, Have the samples of "electrically refined" sugar been, in fact, produced in this way? I am aware that a certain section of the public prefers to take such matters on faith. As a scientific man I must be permitted to be sceptical until proof is forthcoming.

I am, Sir, yours, &c.,

Silvanus P. Thompson.

City and Guilds Technical College, E.C., September 29th.

Referring to the Description of a Diffusion Plant given in the September *Sugar Cane*, the Sudenburger Machine Manufacturing Company, of Magdeburg, write us to say that the cane-cutter with horizontal disc, and with inclined feed hoppers, is the invention of Mr. Stromberg, of that Company, and that it is patented for him by the Sudenburg Company as under:—

In England	.. No. 14,402	In France	.. No. 165,012
,, United States	,, 341,959	,, Spain	.. ,, 8,531

In Belgium .. No. 66,696.

That it has worked at the Dijattiewangie Sugar Factory, in Java, in 1884, and at other factories in Java, Australia, Spain, Brazil, and the United States; that the only firms authorized to make them, in the countries named, are the Company de Five Lille, Paris; and Messrs. Emile & Jules, Halot & Co., Brussels.

The postage on parcels for the Australian Colonies (except New Zealand and Queensland, to which Colonies the parcel post does not yet extend), Hong Kong, and the Straits Settlements, has been reduced, and is now:—

To the Australian Colonies:
  Not exceeding 2 lbs., 1s. 6d.
  For each pound or fraction of a pound additional, 9d.
To Hong Kong:
  Not exceeding 1lb., 10d.
  For each pound or fraction of a pound additional, 6d.
To Straits Settlements:
  Not exceeding 1 lb., 9d.
  For each pound or fraction of a pound additional, 6d.

The Daily City Item (New Orleans), of October 4th, contains a letter from Mr. W. P. Thompson, of Calumet Sugar House, Bayou Têche, Louisiana, which, after speaking of the remarkable progress that has recently been made in this State in sugar manufacturing, says:—

> Stock companies are taking hold here and there, where individual efforts have failed. Small factories are disappearing. The larger ones are increasing their capacity. The rail or tram way is finding introduction. Diffusion will assist all this by securing higher prices to the seller of raw material and protecting the manufacturer against delays from broken mills. Not only have we, of Calumet, at least, *double the yield per ton of the raw material, but by larger operations and improved appliances, have halved the cost of manufacture per ton of finished goods.*

This is certainly very satisfactory reading.

From the *Deutsche Zuckerindustrie* we extract further particulars of the results of the past campaign 1887-88 in German sugar factories· In only two cases, those of *Göttingen* and *Marienwerder*, is there a loss shown, and one is tempted to ascribe the unfavourable position of the latter to some defect in the management, as it appears that the stock from the preceding year was over-estimated to the extent of M. 21,486, which seems to indicate want of care and foresight. The total loss for the year is stated at M. 33,071, making the balance on the wrong side of the profit and loss account M. 131,232. The loss at *Göttingen* was only M. 3,317, more than covered by a credit balance from last year.

On the other hand, the *Badersleben Co.* has made a net profit (after writing off M. 37,715) of M. 260,231, more than half its share capital, which only amounts to M. 453,750. The *Fallersleben Co.*, pays a dividend of 30% on a capital of M. 772,000. Other dividends announced are:—*Alt-Janer*, 15% on a capital of M. 1,500,000; *Culmsee*, 10% on M. 1,300,000, (placing also M. 213,000 to special reserve fund); *Heilbronn*, 10% on M. 1,660,074; *Neuteich*, 8% on M. 600,000; *Gross Peterwitz*, 5% on M. 700,000; *Unislaw*, 5% on M. 430,000; *Bedburg*, 5% on M. 666,000; *Kl. Wanzleben*, 5% and 4%; *Wreschen*, 4% on M. 675,000.

The following net profits are further announced; *Mühlberg a/E*, M. 300,049; *Malchin*, M. 421,522; *Eilenstedt*, M. 145,852; *Ottleben*, M. 63,173; *Zübz*, M. 41,494; *Bernstedt*, M. 13,120.

Ottmachau shows a gain of M. 59,043, after writing off a debit balance of M. 11,845 from last year; and *Zduny*, a profit of M. 43,393, after clearing off a similar debit balance of M. 14,233.

In the following cases, the net profits of 1887-88, as given in detail, have had to be applied towards reducing the debit balances resulting from previous years' losses:—*Güstrow*, M. 104,413; *Maingau*, M. 96,056; *Schwetz*, M. 62,928; *Etgersleben*, M. 46,370; *Neu-Schönsee*, M. 33,977; *Riesenburg*, M. 28,486; *Frankenstein*, M. 23,926; *Bahnhof Marienburg*, M. 10,314.

From Austria comes the announcement of the following dividends:—*Dolloplass*, 18%; *Hohnmauth*, 10%; *Saaz*, 6%.

The *Frameries-Noirchain Co.*, in Belgium, pays a dividend of 20% on its capital of fr. 111,000.

THE SUGAR CONVENTION.

FURTHER CORRESPONDENCE—REPLIES AND REJOINDERS FROM SIR T. H. FARRER, MR. NEVILLE LUBBOCK, MR. GEORGE MARTINEAU, AND MR. SHUTE.

TO THE EDITOR OF "THE TIMES."

Sir,—In my letter of the 3rd of September* I pointed out some of the practical results of the Sugar Convention. Will you give me space for some remarks on the principles of the questions which it raises?

In that letter I said that "Bounties, like protective duties, were bad things;" and the natural rejoinder is, "If so, is not international concert the best way to get rid of them"?

This would be a fair retort if the bounties were necessarily bad things for us as well as for the world, and if the steps we take to get rid of them were not far worse for us. That the Sugar Convention will be very bad for us I have already shown; and will prove it still further.

But are the foreign sugar bounties bad things for us? Are they so bad that their abolition is worth the price we are to pay?

What are the sugar bounties? They are not, as seems sometimes to be supposed, payments purposely made by foreign Governments with the intention of encouraging their manufactures at the expense of ours.

Their real origin and nature is as follows:—

Most nations tax their sugar, and all the nations which do so give back the tax on sugar when it is exported in order that it may not be handicapped in foreign markets. If the tax were taken on the finished article, this repayment would create no difficulty. If 5s. per cwt. were charged on the finished manufacture of a certain description of loaf sugar, 5s. would be repaid by the Government on the export of that quantity of the same article, and the payment and repayment would exactly balance.

But for convenience' sake the tax is levied, not on the finished article, but on the raw material; on the beetroot or on the beetroot juice, or on the raw sugar. A calculation is made of the quantity of the finished article—viz., of raw sugar or of refined sugar, as the case may be, that can or ought to be made out of a given quantity of this raw material; and when that quantity of the finished article is exported the sum repaid to the exporter is the tax paid by him on that quantity of the raw material which, according to the Government calculation, he is supposed to have used in making the exported sugar. But as Government calculations are apt to be fallible, and as manufacture is constantly improving, the maker or refiner gets much more out of the raw material than is allowed for in the Government calculations, and consequently gets back as drawback more than he has paid as tax. If the Government calculation is that he makes a cwt. of sugar out of 10 tons (? cwts.) of beetroot, then, if 5s. is the tax which he has paid upon the beetroot, and if he actually makes 2cwt. out of it, he gets as a drawback on export, not 5s., but 10s. Of this 10s., 5s. is a free gift made to him by the taxpayers of his country on sugar which he exports, and this payment enables him to sell to foreigners with greater profit than to his own countrymen; and, possibly, more cheaply than similar sugar can be sold by makers in other countries who have not the advantages of the so-called bounty.

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* See October *Sugar Cane*, page 523.

The bounty is, therefore, in its inception at any rate, unintentional; it is also a most uncertain thing, varying with the different regulations of each Government; varying with each improvement in manufacture; varying with each different quality of raw material; varying with every parcel of sugar. To determine accurately in any given case whether it exists, and if so what it amounts to, is almost an impossibility.

Before the late Lord Iddesleigh (then Sir Stafford Northcote) finally took off our sugar duties in 1874, we were constantly plagued with this difficulty; since that time we have enjoyed the exceptional advantage, not only of being free from this embarrassment, but of receiving and consuming sugar of all kinds from all quarters without let or interference by the Government or its tax collectors.

That these so-called bounties are bad things for the nations which give them is clear; we may go further, and admit that they are a bad thing for the general industry of the world. Like all Government interferences with the natural course of trade, they make the aggregate product of the world's industry less than it would be if it were left to its course.

But are they a bad thing for us?

This, at a time when most nations are doing their best to injure us by imposing protective duties on our manufactures, is surely the question with which we are concerned. The bounties are in effect a free gift to us by other countries of a certain part of the sugar they sell to us, or of a certain part of the cost of that sugar. Is a free gift of this kind to be treated as an insult or an injury, and are we to spite ourselves in order to resent it?

We are told by persons I feel bound to respect that the free gift conferred on us by these bounties injures the nations which give them; that these nations are our customers, and that, therefore, in injuring themselves they are injuring us. Is this true? Surely the more sugar they sell us the more of other things they will buy from us. But supposing the argument to be well-founded, how far are we to carry it? If President Cleveland were to pay his Western farmers to send us their corn for nothing, should we be willing to pay him a heavy price for ceasing to do so? Many nations, India included, owe us debts and would be the richer, and therefore the better customers, if we ceased to require payment. Shall we on that account cease to require it? I am a free-trader and therefore a cosmopolitan, but here my patriotism gets the better of my cosmopolitanism.

What are the foreign bounty-paying nations themselves now saying about this Convention? The German *Cologne Gazette*, which seldom has a good word for British commercial interests, and which is said to express the opinion of a Government that loses more than any other by its sugar bounties, pats Baron de Worms and his bounty-abolition Convention on the back. The praise of the *Cologne Gazette* is suspicious, but Baron de Worms may be acquitted of any conscious wish to sacrifice English to German interests. As Macaulay's Puritan hated and put down bull-baiting, not because it gave pain to the bull, but because it gave pleasure to the people, so our English Minister, misled by his protectionist leanings, puts down foreign bounties, not because they plunder the German taxpayers, but because they give cheap sugar to his own countrymen. The French newspapers are near the mark when they allege that the real motive of the Baron's zeal against bounties is to protect our West Indian colonies and our British sugar refiners against cheap sugar, and from this they naturally argue that it is to the interest, not of the nation generally as consumers of sugar, but to the interest of British colonial producers and of British refiners that the English Government is looking.

So far as I can see, these producers and refiners are the only persons in this country who are now apologizing for the Convention. Putting aside the well-worn names of Messrs. Kelly and Peters, it is Mr. Lubbock and Mr. Martineau who are the Baron's advocates; and it is at Greenock, the headquarters of the refiners' industry, that he is to sing his song of triumph!

The interests of West Indian sugar growers and of British sugar refiners are worthy of consideration—it may well be of pity. The two interests are not, it will be observed, identical, for it is the interest of West Indian growers to sell raw sugar dear, and it is the interest of English sugar refiners to get raw sugar, whether beet or cane sugar, cheap. The reply, however, to both is that they are not the paramount interests concerned. The paramount interest is that of the British nation as a consumer of sugar. The foreign bounties can only injure either of the two interests above mentioned by making sugar cheaper to us all than it would otherwise be, and the abolition of the bounties can benefit them only by making it dearer to us all.

I have seen it stated that the amount by which a bounty makes sugar cheaper is a certain fixed sum, which corresponds to the actual amount of the bounty. But this is not so. It may be much less, but it may also be much more. For, in the first place, no one, as I have shown, knows or can know exactly what the bounties amount to; and, in the second place, it is not the amount of the bounty, but the relation which bounty-fed sugar bears to other sugar in quantity and in price, which determines the effect of bounty-fed sugar upon the market. Mr. Martineau is perfectly right in saying that there can be but one price in our market for the same description of sugar. But this price may depend upon bounty-fed sugar. If the relative quantity of bounty-fed sugar is small, or if the margin of profit afforded by the bounty is small, the bounty may have a very slight effect on price, and the injury to the home producer will also be slight.

But if the quantity of bounty-fed sugar is such as to enable it to rule the market, the effect of the bounty will be extensive, for the price of such sugar will govern the price of all the sugar in the market, and not that of the bounty-fed sugar only; and if, in addition, the margin of profit caused by the bounty is large, its effect in lowering prices will be intensive as well as extensive. In any case, to exclude bounty-fed sugar must be to deprive the consumer of sugar which he now enjoys.

In short, our English sugar producers and refiners are in this dilemma. To abolish the bounties would either make sugar dearer or it would not. If it did, it would injure the country; if it did not, it would do no good to them. It is only the protectionists who can make things dearer to the seller without making them dearer to the buyer.

Some notion of the possible effect of the boycott of bounty-fed sugar proposed by the Convention may be formed from the following passage in an official memorandum on sugar bounties, presented by Mr. Chamberlain, in August, 1881:—

It has to be considered that the effect of any countervailing duty, such as is proposed would be to raise the price of all sugar imported into the United Kingdom by more than the amount of the duty. Assuming the duty to be ¼d. per lb., or 2s. 4d. per cwt. which is about the amount generally recommended by the complainants, and the present consumption of sugar, which is just under a million tons, to continue undiminished, the amount of the proposed duty alone would represent an additional tax on the community of the kingdom amounting to £2,666,000; and the actual burden of the tax would probably not be far short of £3,600,000, or the equivalent of an income-tax of 2d. in the pound. This income-tax would probably be paid for the most part by the working-classes of the United Kingdom. It would amount to as much as the aggregate of what is now paid for national education by grant from the public Exchequer.

The effect of the proposed duty may be illustrated in another way. The average annual consumption of sugar in the United Kingdom being about 64lb. per head, a duty of ¼d. per lb. would be 1s. 4d. per head, and at an average number of five persons per family, 6s. 8d. per family, while the actual burden on the consumers would probably be nearly 2s. per head, or 10s. per family. Of course, the poorer classes of workmen would not actually pay so much, but they would probably feel the tax by the increase of price restricting their consumption, and so depriving them of a portion of the luxuries and even necessities of life which their hard-earned incomes enable them to enjoy. (Parliamentary Paper, 422, 1881, page 5.)

In Mr. Giffen's Report on the Progress of the Sugar Trade, laid on the table by Mr. Chamberlain in 1884 (Parliamentary Paper 325, 1884, page 22),* it is stated that, "according to the calculations of the anti-bounty agitators before the Select Committee, the excess reduction of price due to the bounties was ¼d. per lb., which is equal to 2¾ millions sterling on the consumption of sugar in the United Kingdom," and that, "according to a more recent estimate by the West India Committee, the excess reduction was then (1884) about £5 a ton, which was a gain of over £5,000,000 annually to the people of the United Kingdom, or more than the entire annual value of the sugar produced in the West Indies" (estimated at £4,500,000), "and twice the fixed capital sunk in sugar refining in the United Kingdom" (estimated at £2,750,000).

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* Note.—For a summary of this Report, see November, 1884, *Sugar Cane*, page 595.

The above calculations depend on statements which had been made from time to time by the anti-bounty agitators. When the object is to show how much the sugar refiners lose by the bounties, the figures are apt to swell. When the object is to show how little the consumer will lose by the abolition of the bounties, the figures are apt to shrink. The above figures are therefore hypothetical; and, as will be observed. they relate to a countervailing duty, not to a boycott; but the effect of a boycott on the price of sugar would probably be more serious than that of a countervailing duty.

About the importance of cheap sugar there can be no doubt. Think, for a moment, what it means. It means a cheap supply of an article so important that it costs the nation £30,000,000 a year, or as much as half its whole supply of bread costs us. It means that every householder in the country gets good sugar at less than one-half the price paid for it in the countries where it is made. It means a cheap luxury in every cottage, a cheap cup of tea, cheap jam, a cheap tart, a cheap pudding.

It means cheap material for the jam and confectionery business. It meant in 1884 as much as 100,000 tons of sugar employed in that business. It also meant in 1884 employment in that business alone for more than 12,000 hands, or more than twice the number of hands employed in British sugar refineries. It means employment of other kinds in other businesses—in the biscuit trade, in fruit growing, and in a variety of other trades. Are these interests which ought to be trifled with?

We are told of fabulous numbers of persons employed in the sugar refineries and in subsidiary employments—shippers, barrel makers, packers, and so on. Are there no subsidiary British employments connected with the importation and use of foreign sugar? Are there no workmen employed in the manufactures which we must export in order to pay for foreign sugar, and upon subsidiary British employments connected with those manufactures?

Consider for a moment what the effect of the Convention may possibly be upon the market and upon price. France, Austria, Brazil, and the United States, all of them countries which do not adhere to the Convention, are all countries which produce sugar largely, or which refine it largely, or which do both (and for the purpose of this Convention refining is placed on the same footing as original production). All of these countries give, or have been alleged to give, bounties in some form and to some extent on one or both of these processes. In the course of the rapid changes to which the growth and manufacture of sugar are subject, any one or more of these countries might become our principal source or principal sources of supply, not by means of bounties, but by fair improvements in growth, production, and manufacture. And yet, if these countries do not join in this Convention—if they decline, as we in former days always declined, to adopt the harassing system of manufacturing or of refining under Excise supervision, and if their rivals and competitors determine that they give ever so small a bounty on ever so small a quantity of the sugar which they export—we shall be bound, under this Convention, in breach of any most favoured nation treaties we may have with these countries, to refuse, not only such part of their sugar as is bounty-fed, but all sugar whatever which comes to us, directly or indirectly, from them. We may thus be shutting out, at the instance of their rivals, our best, cheapest, and most natural sources of supply, and irritating by breach of treaties our best customers, without any consideration whatever, except a doubtful protection to the capitalists who own West India estates and the small class of British sugar refiners. Was there ever such a Convention?

There are many further objections in principle to this Convention. If we are to begin a system of retaliation upon bounties, where is it to end? These sugar bounties are uncertain, and in their origin, at least, unintentional. But there are many bounties which are direct, certain, and intentional. I need not mention the bounties given by France and other nations to their shipping. Brazil guarantees, or lately guaranteed, a high rate of interest to the capital employed in sugar making; our own colony of New Zealand recently passed an Act granting a bounty of ½d. per lb. on the first 1,000 tons of beetroot or sorghum sugar produced in the colony, besides other special privileges to her own sugar growers. Are direct bounties such as these to come under the conventional boycott? Many countries, India and Australia for instance, build at the public cost railways which carry their corn and other produce on its way to this country, and many of these railways do not pay their expenses out of the rates they earn. Many countries act in the same way by harbours. The Governments of Europe joined in raising and guaranteeing a large loan for improving the navigation of the Danube, by which means the corn of Roumania was brought into competition with that of Lincolnshire. These are all special advantages given by Governments to the exports of particular produce, and cheapen that produce in our markets. Is all this produce to be boycotted as bounty-fed? Many nations, Germany for instance, give, or are said to give, differentially low railway rates on goods intended for export. Are such goods to be boycotted? Many Governments in many ways encourage their agriculture and manufactures at the public cost. Are we to inquire whether this is the case before we admit their produce? Surely the only wise and safe course is that stated in the following extract from Mr. Chamberlain's memorandum above referred to:—

> The general principle which governs the financial policy of this country is that the Government shall not interfere with the course of trade, either by giving bounties or imposing duties. To this policy no exception has hitherto been made, whatever may have been the conduct of foreign Governments, either in encouraging their own manufactures or in discouraging ours. (Parliamentary Paper 422, 1881, page 3.)

Further, this Convention requires us, if we ever tax sugar ourselves, to refine it in bond; it also requires us to boycott sugar from our colonies if they are adjudged by the majority of the parties to the Convention to give bounties, and it absolutely prevents us from making arrangements with our colonies favouring their sugars.

I shall not be suspected of a desire to tax sugar, still less of any leaning towards the policy of the Fair Trade League. But no one can tell what our future necessities may be, and no one—not even Mr. Lubbock or the present Ministers of our colonies—can say what their people may hereafter do in the way of taxing or dealing with sugar. Canada now protects her refiners by high duties, and New Zealand gives, or lately gave, a direct bounty on the growth of sugar. Under such circumstances Free-traders may well join with Fair-traders in objecting to a Convention which will give Russia or

Germany, or any other foreign Power, a right to interfere with our self-taxation, to dictate to us the relations between different parts of the Empire, or to call on us to exercise a control over our colonies which we do not exercise at present for our own sake. Freedom of export and import is a very important thing. But it is a still more important thing to retain national freedom of action, especially when the only price we are to get for surrendering it is a *minus* quantity.

Need I enlarge upon the official difficulties and embarrassments which must attend the operation of this Convention—embarrassments hardly less injurious to trade than the more obvious evils I have already referred to, *e.g.*, the differential treatment of sugars from different countries; the questions, what is raw and what is refined sugar; what amount of refining or manufacture constitutes sugar the production of a particular country; what country any given sugar comes from, with the plague of certificates of origin and other attendant nuisances, which used in the days of our own protective system to drive the officers of the Customs and the Secretary to the Treasury wild; and, what is worse, to throttle business in an inextricable tangle of red tape?

So far for the sugar bounties pure and simple. But the principle involved in this Convention goes much further, and is open to still graver objections.

Foreign protective duties do more harm to our manufacturing interests than the sugar bounties do to our refiners; but we do not retaliate upon the nations which impose them by excluding their products from our ports.

When the Germans, the Americans, or the Canadians put a prohibitive duty on our iron, they rob their own consumers in order to nurse their own ironmasters; but they also take the bread out of the mouths of our ironworkers in Cleveland, Staffordshire, and South Wales. We, however, do not prohibit or put a retaliatory duty on German goods or on American or Canadian corn or beef. Why? Because, if we did, we should, in the first place, be making such goods, corn and beef, dearer to ourselves; and, in the second place, we should be taking away work and employment from those British workmen who make the English goods which are exported to pay for the imported corn and beef. We might hurt Germany, America, and Canada by the retaliation, but we should hurt ourselves still more.

The same reasons apply *a fortiori* to retaliation against bounties.

If we prohibit bounty-fed sugar, we make sugar dearer to our own people, and we put a stop to those manufactures of our own which we now export in order to pay for the bounty-fed sugar. At the time when our sugar imports from Germany, Holland, and Belgium increased by three millions sterling—in consequence, it is said, whether truly or not, of bounties—our exports to those countries increased by more than four millions. This may be only a coincidence; but it is, at any rate, a good illustration of a general economical truth.

Surely this case of sugar bounties is not a case, if any case there can be, for beginning to trifle with that two-edged weapon "Retaliation." If we once accept the retaliatory policy of the Convention and promise to prohibit bounty-fed sugar, we shall not only lessen one of the greatest comforts of the poor and one of the principal materials of our industries, but we shall be making a fatal precedent. If it is right to retaliate on bounties, it is much more right to retaliate on protective duties. If we refuse to accept of sugar because it is the produce of a protective system, how long shall we continue to buy corn which comes from protectionist countries?

Our true policy is to let foreign nations take care of themselves. *If we want them to adopt sound principles, let us not teach them by our example that we are afraid of free imports.* When they in their folly offer us a free gift, why should we be so foolish as to refuse it? Our position was an excellent one before the present Government began their crusade against the sugar bounties. That false step has led by natural consequence to the mischiefs and absurdities of the present Convention. The results are bad, not because there has been any want of pains or care on the part of Baron de Worms, but because his position was a false one, and his policy and objects wrong *ab initio.* Keen-sighted for the narrow interests of a small producing class; blind to the wide interests of a great consuming and producing nation; masquerading as a Free-trader, but in fact a Protectionist; the would-be mentor of foreign Statesmen, but in reality their tool; Baron de Worms has framed, and has induced his colleagues to accept, a Convention, which, in view of its direct objects and results, is both ineffectual and mischievous; but which, in view of its ulterior consequences, is yet more objectionable; being, as it is, the first step openly taken by the British Government in the direction of commercial retaliation and restriction, the first official abandonment of that policy of free imports which, in the last half century, has done so much for the material welfare of our toiling millions, and which, by promoting their material welfare, has made moral and spiritual progress possible. It is a very serious and important step. Let us pause before it is too late.

In the above remarks I have trusted to principles, and have used few figures. Those who wish to see the statistics and facts of the trade as they stood in 1886 will find them in chapter 48 on Sugar, pp. 246 to 265, third edition of my book "Free Trade *v.* Fair Trade," published by Cassell and Co., and in the official papers there referred to, from which the figures were taken. The tables contained in Parliamentary Paper 312, 1887, contain some more recent figures. But for complete recent statistics we must hope for the returns ordered last Session, but not yet published. We may hope for these when Parliament meets; and we may also hope to know whether there is any truth in the newspaper reports that Belgium has already withdrawn or qualified her adherence to the Convention.

T. H. Farrer.

Abinger Hall.

This letter has called forth the following replies:—

To the Editor of "The Times."

Sir,—I had hoped that the Sugar Convention might now have been allowed to rest until the House of Commons' discussion takes place, when I venture to say the public will have a better opportunity of learning the truth about the bounty question than by reading Sir Thomas Farrer's one-sided and incorrect statements.

I cannot claim your indulgence to afford me space to answer in detail the three columns of statements and arguments occupied by Sir Thomas Farrer's letter in *The Times* of the 3rd inst. I would, however, ask your permission to make a few general remarks in reply.

Sir Thomas appears to maintain:—

1. That if bounties are abolished sugar will become dearer.

2. That bounties are bad things, but foreign protective duties are worse, and that as we do not remedy the one evil we must not remedy the other.

3. That bad as bounties are for the general industry of the world they are good for us.

4. That by stopping bounty-fed sugar "we put a stop to those manufactures of our own which we now export in order to pay for the bounty-fed sugar."

My reply is as follows:—

1. The highest authorities upon sugar, both in Germany and England, are of opinion that if bounties are abolished the value of sugar will not be raised. Ample reasons could be given for this if space permitted.

2. We do not interfere to get rid of protective duties abroad because we cannot do so effectively. If Baron de Worms could bring about a mutual agreement among foreign Powers to abolish protective duties in the same way as he has brought about an agreement to abolish bounties, he would undoubtedly have a double claim on the gratitude of his countrymen.

3. Sir Thomas assumes that bounties have reduced the price of sugar, apparently £5 per ton, judging from a quotation he gives from a report of Mr. Giffen's. It is not impossible that at some particular moment, as in 1884, sugar was £5 per ton below the price it would have been at had bounties never existed, just as in 1877 the price was probably £10 per ton higher from the same cause, but the idea that sugar has been permanently at a price anything like £5 per ton below what it would have been but for bounties is quite preposterous. At the present moment I am confident that there is no depreciation due to bounties. But even if Sir Thomas could show some slight gain in price, he has an annual loss of from £3,000,000 to £4,000,000 to set against it.

4. It surely seems hardly necessary to point out that if bounties are abolished manufactures of our own will be equally exported to pay for non-bounty fed sugar.

Bounties are bad things, says Sir Thomas Farrer, but they are better than free trade. Is not Sir Thomas "masquerading as a free-trader?"

I remain, Sir, your obedient servant,

N. Lubbock.

North Berwick, October 6th.

To the Editor of "The Times."

Sir,—Sir Thomas Farrer's second letter expands to three columns what he had previously said in one; but it does not, with one important exception to which I will presently refer, add a single new point or argument to those contained in his former letter, to which you kindly permitted me to reply. Sir Thomas Farrer has paid my arguments the greatest compliment he could by not noticing them.

His former letter was characterised by Mr. Gladstone as "weighty.' The present one is full of brilliant and telling phrases, and Sir Thomas Farrer is no doubt right in thinking that they will answer his purpose better and be more likely to make progress with the public than the drier process of close reasoning, or the accurate use of words.

Sir Thomas Farrer's contention, identical in both letters, may be divided into two main propositions, viz.:—

1. That the bounties are good things for this country, because they make sugar cheaper than it would otherwise be.

2. That the convention for their abolition is a protectionist measure, contrary to the principles of free trade.

These two points are amplified and reiterated in various forms and many taking phrases; but that is what they amount to. We have replied to them for years in letters to the Press and counter-memorandums addressed to the Board of Trade until we are quite ashamed to repeat the same language so frequently. No one has ever attempted to grapple with our argument, and yet the same brilliant phrases continue to appear from time to time, and no doubt dazzle many a casual reader.

With regard to the first of these two short propositions to which Sir Thomas Farrer's four columns may be reduced, it is fortunate that he has now made an admission which goes far to cut the ground from under his own feet. "It is not the amount of the bounty," he points out, "but the relation which bounty-fed sugar bears to other sugar in quantity [and in price], which determines the effect of bounty-fed sugar upon the market." This, with the exception of the words which I have put in brackets, which appear erroneous, is exactly what I have always urged as the true state of the case, and I am glad that Sir Thomas Farrer has now adopted the same view, because it clears away a host of misconceptions. It is not the amount of the bounty, but the increased production brought about by the bounty which affects the price of sugar. This being so, and I think no one can dispute the fact, much which follows might be omitted from Sir Thomas Farrer's letter. He quotes some passages from one of the many long memorandums of the Board of Trade, based on the assumption—now shown by his own reasoning to be erroneous—that the cheapness is to be measured by the amount of the bounty. The conclusions arrived at on that basis are, therefore, utterly erroneous and misleading, and it is curious that Sir Thomas Farrer should lay stress upon them immediately after showing by his own argument that they are based on false premises.

The facts with regard to the effect of bounties on prices are very distinct and simple. The bounties on production have unnaturally stimulated it; consequently the market has, from time to time, been temporarily glutted. This has been followed by the natural process of reducing production and a restoration of the equilibrium between supply and demand. If bounties were to continue indefinitely this would repeat itself until all natural production disappeared and the world was supplied entirely from bounty-fed sources. Practically, of course, this is impossible; but theoretically it is the completion of the curve. Now, in the swing of the pendulum between artificially stimulated over-production and the reduction of stocks to normal proportions, it is clear that the market will pass for a short time through a period of low prices. If these low prices were the result of natural instead of artificial over-production the remedy would take a natural course. But with the disturbing element of bounties the course taken by the industry is also abnormal, and, as I maintain, seriously hurtful to the interests of the consumer and the nation at large. Instead of producers straining every nerve to be foremost in the race, they are deterred by the very natural feeling that, however highly they may farm, however perfect their machinery may be, there is still the bounty looming in the background, against which they cannot contend by any amount of perfection in cultivation or manufacture. What has the result been? That, while the production of beetroot has increased by leaps and bounds, there has been very slight increase in the production of cane sugar. In other words, the whole of the enormous yearly increase in the world's consumption has been filled up by beetroot sugar, stimulated by bounties. The injurious result to the consumer has been illustrated several times during the last few years. A short beetroot crop means now a rise of 50 per cent. in the price of sugar.

So much for the bounties on production. The bounties on refining affect prices in an entirely different way. The refiner depends solely on the margin between the price of raw and refined. It is to him immaterial, from that point of view, what price he gives for his raw sugar. He knows that he and his competitors all get it at the same price, and that he must get such a price for his refined as will pay the cost of refining and leave him on the right side. A penny per ton, or any other fraction you like to mention, will therefore turn the scale between profit and loss in his case, and this fraction, though ruin to him, is quite inappreciable to the consumer. In his case, moreover, this process of underselling by a mere fraction below cost price is continuous, instead of coming, as in the case of the producer, in short periods of low prices followed by a rebound of the pendulum.

So far as bounties on refining are concerned, therefore, the consumer (including the jam and confectionery maker) makes no appreciable gain from bounties, and will suffer no appreciable loss by their abolition.

The bounties on production, on the other hand, cause the market to be periodically glutted, during which period the consumer gets his sugar for a short time at a low price. But he has to pay so much the more when the pendulum swings in the opposite direction, since he becomes each time more and more dependent on the beetroot crop, the practical result of which has been that several times during the last few years he has had to pay an advance of 50 per cent. But a far more serious effect, as I have pointed out, has been that all natural enterprise among cane sugar producers has been paralized, natural progress in manufacture stifled, and natural extension of cultivation hindered and discouraged. Sir Thomas Farrer wishes that this artificial hindrance to progress should continue, and he advocates it not only in the interests of the consumer, but, more extraordinary still, in the name of free trade!

If you will allow me I will give you my reply to Sir Thomas Farrer's other point in a second letter.

I am, Sir, your obedient servant,
George Martineau.

21, Mincing Lane, October 5.

To the Editor of "The Times."

Sir,—The members of the London Workmen's Anti-Sugar Bounty Association have read with some pain and no little curiosity Sir Thomas H. Farrer's letter of three columns upon the Sugar Convention which appeared in *The Times* of the 3rd inst.

It pained us to witness so much zeal for the maintenance of the bounties. In a letter that appeared as recently as last month, and upon previous occasions, Sir Thomas Farrer, without reserve, condemned the bounties as bad things. He then only exhorted the masters who were being ruined by the bounties, and their skilled *employés*, in danger of finding themselves levelled down to the condition of day labourers, to bear patiently, as inevitable, the great injury which attends this pernicious system. But now he defends it by special pleading, and notwithstanding his social position and official experience, we feel constrained to ask, "Who is this that darkeneth counsel by words without knowledge?"

There is a great deal of padding in the letter of the 3rd inst., intended to gain the interest and the votes of many who are not acquainted with the sugar trade and the history of the origin and effect of the bounties. The letter before us contains much that is true, and much that is new, but unfortunately "that which is true is not new, and that which is new is not true."

Sir Thomas Farrer seems to go much further in this attempt to discredit the labourers of the Government than he has ever done before, and it appears to us that "more is meant than meets the ear." It is not until we have nearly arrived at the bottom of the first column that we find anything worthy of notice. After an illusion in very bad taste to Messrs. Kelly and Peters, with whom our association has no connection whatever, but who have certainly worked hard for our cause, and persevered for many years, and after a sneer at Baron de Worms and at Messrs. Martineau and Lubbock, we come to the assertion that foreign bounties can only injure the West Indian sugar growers and the British sugar refiners "by making sugar cheaper to us all than it would otherwise be, and the abolition of the bounties can benefit them only by making it dearer to us all."

There is a studied injustice in this statement which we hope the majority of fair-minded men will perceive. The object of the Convention, with which every State that attended it agreed in principle, is to put an end to an artificial price that is destroying a home industry. Neither the British public that consumes, nor the jam boilers and kindred trades, the makers of brewers' substitutes, &c., have any right to receive the inducement of the bounties to patronize the foreigner. The sugar can be refined in many parts of the United Kingdom certainly as well and as cheaply as in any other country, and therefore the difference caused by the bounty is not a question of the cost of production. It is simply a bribe. We are not asking for any "benefit' when we demand that this premium shall be defeated by the decision at which the majority of the Convention has agreed to.

Although the bounty is only one farthing per pound, it has been found to be sufficient to nearly destroy the home industry of sugar refining, and to make moribund what still survives of it. Our association includes all the *employés* of the sugar refineries that have not closed their gates in this immense gathering of population and consumers in the whole valley of the Thames between Windsor and Woolwich. Our name unfortunately is not "legion," for only four refineries remain at work. Our association was formed about 12 months ago, when five refineries were open, and every man in them eagerly joined us. There are only four at work now, and some of our members have for months been depending upon precarious employment about the docks, losing probably half their time. Others, who once earned their 30s. and 35s. per week, are now hiring barrows at one shilling per week, and trying to sell toys and other things in the streets. When we see this outcome of the bounty system, producing so much suffering among skilled and industrious citizens, we feel bound to declare that there is "something rotten" in it. The professors who regard it from a very different point of view, do not admit this undeserved suffering into their calculations. We can point out to them that there are more things in Heaven and earth than are dreamt of in their philosophy. It cannot be worth while, for the sake of the saving of one farthing per lb. below the true cost of production, to suffer an independent honest industry, that asks no favour, to be destroyed. Probably there is no other business in the world that sails so close to the wind. It is worked by the exercise of the most rigid economy, and by the rapid turnover of a very large capital. It is easy to understand that one farthing per lb. advantage granted by foreign exchequers to foreign competitors must speedily put an end to sugar refining in this country.

The Government has certainly been right in counting the cost of the loss of this manufacture to the community—the loss of costly plant and the suffering of working men, and balancing these losses against the almost imperceptible eleemosynary saving in the domestic use of sugar, or in its employment in trades that have no right to, and no occasion for, this advantage. The bounties perhaps, on the average, reduce the price of sugar one farthing per lb. below the true cost of production. Perhaps they do not affect the price quite so much. Some portion of the premium, after underselling the British refiners, may remain in the foreigners' pockets. But certainly this premium cannot permanently affect the price by more than its own value. It has not got the purse of Fortunatus. Reversing this rule, if we succeed in defeating the bounties by the agreement of the Convention, the price cannot remain higher than the point from which these meddling bounties had depressed it, whatever may be the temporary effect of speculation.

Sir T. H. Farrer may be an excellent theorist, but we do not accept his *ipse dixit* upon the working and the fluctuations of markets, for he is not a merchant. We see no reason why we should hesitate to do away with an evil which has been condemned by Mr. Gladstone in unmeasured terms as well as by the leaders of the party now in office.

Our opponents seem to treat us as if we had no existence. But thanks to the Government we have not been forgotten.

We wish our fellow citizens to reflect and judge what would be now the general opinion about the bounties if the refining of sugar had been localised in one particular portion of the United Kingdom, instead of being distributed all over England and Scotland. If, for instance, the whole body of masters and men, with their capital and their acquired skill, were already ruined and suffering, or in imminent jeopardy of bankruptcy and the workhouse. If these were all concentrated in such a condition within one of the four provinces of Ireland, so as to arrest the attention and the sympathy of everybody—especially if it were obvious to the least observant that there were no other available manufacturing employments in the province except agricultural labour—we might feel sure that no theories would hinder us from applying a remedy.

We desire that practical men capable of taking large views and of considering every interest should deal with a great question like the bounties. We do not wish it to be left in the hands of experts. The great Richard Cobden, who introduced and negotiated the French Commercial Treaty, would never have adopted Sir T. H. Farrer's academical views of this international question. The Baronet's letter would have us believe that we gain customers for British manufactures by giving a preference to bounty-fed sugar. This is quite an incorrect argument, because the bribe of a farthing per lb. cannot appreciably increase the consumption, and our custom is only transferred from sugar producers in other parts of the world, who would not take less and might very likely take more of our commodities in exchange for their raw material. It is for our advantage that the cultivation of cane sugar throughout the breadth and circumference of the tropics should be encouraged by the abolition of the bounties. We should then be less affected by the local accidents of a failure of crops, and a great deal more employment would be given to shipping and to our docks and to all other waterside interests.

It is obvious that it would be better for the whole community if the trade were restored to its natural channels by the destruction of the bounties. The majority of the Convention has agreed to a certain course, and those who still hesitate will find it necessary to come into the agreement, as they cannot do without the great British market.

Touching upon the question of markets, we come to the last argument in the letter before us which seems to us to be worthy of notice, and that is the comparison between retaliation to induce other countries to practise free trade with us, and the destruction of bounties by countervailing duties or by exclusion. The difference is very obvious. Retaliation fails because we do not control the markets of other countries. We double the injury to ourselves by increasing the cost of what we could import for our own use, and we appear to have become converts to the principles of protection, which we strengthen by our example. On the other hand, what our Government has joined the majority of the Convention in agreeing to do is simply to prevent the sale of bounty-fed sugar at an artificial price which is unjust to a great interest in our own market, which we absolutely do entirely control; and as no other sugar-producing country can get along without this market it is quite certain that the object of killing the bounties must be accomplished.

Yours respectfully,

George Shute.

Member of the Executive of the London Workmen's Anti-Sugar Bounty Association, representing all the operatives of the sugar refineries now remaining at work in London and in London suburbs, viz.:—Messrs. H. Tate and Sons, Thames Sugar Refinery, Silvertown, Essex; Messrs. A. Lyle and Sons, Plaistow Wharf Sugar Refinery, Silvertown, Essex; Messrs. D. Martineau and Sons, St. George's East, London; Messrs. L. Cowan and Sons, Hammersmith, London, S.W.

Thames Sugar Refinery, Silvertown, Essex, October 6.

These replies have brought forward the following rejoinder from Sir T. H. Farrer:—

To the Editor of "The Times."

Sir,—To answer fully the letters of Messrs. Lubbock, Martineau, and Shute in *The Times* of to-day, would be to repeat my former letters, already too long.

I have never said that the present bounties are making sugar cheaper, much less that they are doing so by any given amount, because I do not know. What I have said is that they can only injure our own producers by making sugar cheaper; and I referred, by way of illustration, to some of the proposals made by anti-bounty agitators for countervailing duties, which, according to Mr. Chamberlain's official memorandum, would have raised the cost of sugar to the nation by an amount equal to a 2d. income-tax, or to the sum contributed by the public Exchequer towards national education. I further said that the proposals of the present Convention would probably be far worse than any countervailing duties, because they would substitute absolute prohibition for a differential duty; they would prohibit a great deal of sugar which in all probability would not be bounty-fed; and they would do this, not of our own free action, but at the dictation of foreign countries which are rival producers.

The only point in the letters above mentioned requiring further notice is the argument that bounties cause an unnatural growth of production; that this, while it may create a temporary glut and fall of price, must be followed by reaction; that in the meantime it paralyzes natural production; and that it will in the end lead to a contraction of supply and a permanent increase of cost to the consumer.

A complete answer to this argument would involve a history of the sugar trade. The principal facts down to 1884 will be found in Mr. Giffen's official report on the progress of the sugar trade. No. 325 of 1884. This, it is to be hoped, will soon be continued to the present time. In the meanwhile the tables contained in No. 312 of 1887 give some facts which show how little ground there is for the above apprehensions.

It appears from them that the area of sugar production is steadily widening and the amount produced increasing, that every quarter of the globe and almost every country, every soil, every climate is adding a larger and larger contribution to the general result; that there is no commodity so widely and so variously produced; that cane sugar, which, so far as I know, is nowhere bounty-fed, is at present holding its own with beet sugar; that British cane sugar is holding its own with foreign cane sugar; and that our own consumption, while the largest in the world, is, on the whole, in common with that of other countries, largely and steadily increasing.

I admit that bounties are one out of the many causes which lead to fluctuations in production and in cost, and, further, that they are causes which it would be well to eliminate, if it could be done without producing worse evils.

I have sympathies with our West Indian colonies, and still more with our own refiners; but I have sympathies yet stronger still with our own consumers. I repeat that the remedy proposed by the Convention is far worse, directly and indirectly, than any evil caused by the bounties; that it will not put an end to bounties; that for us, whatever the evils of bounties, there is a countervailing and preponderating advantage; and that this case of sugar is the last case in which we should depart from our well-tried policy of free imports, and adopt the fatal precedent of refusing to receive foreign goods, because the country of production is pursuing a protective policy.

T. H. Farrer.

October 10.

To which Mr. G. Martineau replies as follows:—

To the Editor of "The Times."

Sir,—At last Sir Thomas Farrer has replied to the arguments and facts by which we have traversed his original statements. Fortunately his reply is brief, so we can now bring the issue to a point. He does not, he says, maintain that bounties are making sugar cheaper, but he sticks to it that their abolition will make it dearer. In support of this paradox he cites, as usual, a memorandum of the Board of Trade which asserts that even the countervailing of the bounty would raise the price of sugar by a sum equal to a 2d. income-tax. As we have already shown that even if bounty-fed sugar were prohibited prices would not be in any way affected, and as Sir Thomas Farrer has not dealt with our argument, it does not appear how quotations from his own memorandums strengthen his position. This is followed by a denial that the artificial stimulus to the production of beetroot sugar hinders progress in the production of cane sugar and thereby makes the consumer every year more dependent on the beetroot crop. He supports this denial by quoting a Board of Trade report on the progress of the sugar trade. Well, all I can say is that we who pass our lives in the sugar market, and learn every fact respecting it with microscopic accuracy, are almost as good judges on this matter as the Board of Trade, which gets its information second-hand. In any case, I defy any statistics to disprove the simple fact that the increase in the world's consumption is being supplied by bounty-fed beetroot sugar.

The rest of Sir Thomas Farrer's reply is merely a reassertion of statements, not a dealing with our refutation of them.

I am, Sir, your obedient servant,
GEORGE MARTINEAU.

21, Mincing-lane, Oct. 12.

To this letter, Sir T. H. Farrer replies, in *The Times* of October 16th, and puts certain questions to Mr. Martineau:—

TO THE EDITOR OF "THE TIMES."

Sir,—There are two apologies for the Convention in *The Times* of October 13. One is from Lord Knutsford in his speech at Ipswich. After hoping that we should secure a fair field for our great sugar-producing colonies, who have suffered so much from foreign bounties, he goes on to say that he does not believe the consumers in this country will have to pay one farthing more for their sugar than they did before. The other is from Mr. Martineau, in reply to a letter of mine showing that cane sugar holds its own. After repeating that if bounty-fed sugar were prohibited, prices would not be in any way affected, he concludes with the following remarkable statement:—"In any case I defy any statistics to disprove the simple fact that the increase in the world's consumption is being supplied by bounty-fed sugar."

I confess that these utterances puzzle me; to a simple mind they appear inconsistent with each other, if not with themselves. Perhaps Mr. Martineau can explain them. He knows, as he says, much more about the matter than an old official of the Board of Trade, who cannot even tell whether the recent low prices are or are not due to bounties; probably more than Lord Knutsford, who modestly tells us that he does not profess to be great at figures. Will Mr. Martineau answer the following questions:—

If bounty-fed sugar causes suffering to our own sugar producers, how can it do so except by increasing the supply and lowering the price of sugar? If the exclusion of foreign bounty-fed sugar is to benefit our own sugar producers, how is it to do so except by restricting supply and increasing price? If bounty-fed sugar is the only source of supply from which the enormously increasing demand of the world is being met, and we cut off that supply, how can we do so without obliging people to use less sugar, or to pay more for it than they would do if that supply were not cut off? When Mr. Martineau has answered these questions there are plenty of others.

T. H. Farrer.

Mr. Martineau continues his reply to Sir Thomas Farrer's former letter, and also answers his questions, in the following letter, which appeared in *The Times* of October 23rd:—

To the Editor of "The Times."

Sir,—I hope I have succeeded, in my replies to Sir Thomas Farrer, in showing that bounties are not, as he contends, good for us, but that, on the contrary, they are bad for the consumer as well as for the producer. I will now deal with his other main point, and show that the convention for the suppression of these bounties is not, as Sir Thomas Farrer desires his readers to believe, in any way contrary to the strictest principles of free trade, but that, on the contrary, it is the only means by which free trade in sugar can be restored. I admit that all this has been proved *ad libitum* in reply to the same assertions when emanating from the Board of Trade, and I fearlessly assert that no attempt has ever been made by that department to meet our arguments. But, unfortunately, the readers of Sir Thomas Farrer's brilliant letters in your columns are not aware of this, and I fear that, with many, smart sentences go further than dry argument. I hope, however, that any one who will give a moment's reasonable consideration to the subject, unbiased by the unaccountable influence of party spirit which seems to have distorted the vision even of some clear-sighted people with regard to this purely scientific question, will admit at the outset that the effect of foreign bounties on articles imported into this country is to protect the foreign producer on our markets—that is, to give him an artificial advantage here over other producers. This is clearly a flagrant outrage on free trade principles, and no amount of eloquence or strong language ought to blind the eyes of reasonable people to the fact, or make them fancy that the removal of this protection to foreigners on British markets is in any way inconsistent with free trade principles. On the contrary, it might naturally be supposed that every reasonable man would at once exclaim, "It is evidently absolutely necessary, if free trade in sugar is to be maintained in this country, that these bounties should be abolished, neutralized, or prohibited." So long as they continue to operate on our markets they have the same effect as if a differential duty were levied on all sugar not bounty fed. The word "protection," as used in connection with free trade, means an artificial advantage given to one producer over another, and we free-traders maintain that it is wrong in principle and injurious in practice that any such artificial advantage should exist, even when it is conferred on our own producers. How much more must it be wrong in principle and injurious in practice when the artificial advantage is conferred on the foreigner to the detriment of the British producer in his own market. But, though we destroy free trade, we get our sugar so wonderfully cheap! That is what Sir Thomas Farrer, the Board of Trade, and the Cobden Club have always fallen back upon when driven into this corner. This I have already disposed of by showing that there is no appreciable gain even in the supposed temporary cheapness; and that any artificial cheapness involves a diversion of the current of production, which must end in the loss or great reduction of the natural sources and the consequent dependence of the consumer on artificial sources of supply. The sugar bounties have already lasted long enough to give practical illustrations of this fact, several serious rises having occurred in the market in recent years, owing to the constantly increasing dependence of consumers on the success of the beetroot crop.

The reasonable reader, to whom I have already appealed, would conclude that Sir Thomas Farrer, after these points had been made clear, would be disposed to modify his views. And there can be no doubt that under ordinary conditions of discussion, with the single view of arriving at the truth, this would be so. But, as it is, we have still the same mirage of politics hovering over our unfortunate sugar question. Hence such phrases in Sir Thomas Farrer's last letter as the following:—"Our English Minister, misled by his Protectionist leanings, puts down foreign bounties, not because they plunder the German taxpayers, but because they give cheap sugar to his own countrymen." "Keen-sighted for the narrow interests of a small producing class; blind to the wide interests of a great consuming and producing nation; masquerading as a Freetrader, but in fact a Protectionist"; and so on. This is not dealing with an abstract question of political economy in a scientific way, but simply following out the old rule of abusing the attorney on the other side.

Sir Thomas Farrer says a good deal about retaliation—with a capital R—but I think my friend, the reasonable reader, will at once see that there is no retaliation in the matter. Parrying a blow is not retaliation, though Sir Thomas Farrer wishes us to believe that it is. Protection to foreigners on British markets is against our free-trade principles and contrary to justice and our own interests. We therefore enter into a convention with certain countries to secure the abolition of this protection. But the foreign Governments naturally point out that they cannot enter into this arrangement unless they have some security that they, in their turn, will not have to compete with bounty-fed sugar. It would be impossible to make a treaty without such security, and, as the object of the treaty is the abolition of the most aggressive kind of protection, there can be nothing of the nature of retaliation in giving the required security in order to obtain a general agreement for the abolition of the protection. All this is so self-evident that it seems almost ridiculous to state it in words, and yet we are still met with the accusation of "trifling with that two-edged weapon 'Retaliation.'"

Having started with the two fallacious assumptions, that bounties are good for us because they give us cheap sugar, and that their abolition involves "Protection" and "Retaliation" (the capitals are not mine), Sir Thomas Farrer makes the most of them in every by-path he can possibly discover. The "jam argument" was regarded by the Board of Trade for years as a splendid red herring to distract attention from the real facts of the sugar question, and Sir Thomas Farrer still shows how well this telling point can be brought in. A moment's reflection suffices to show how absolutely baseless it is. According to Sir Thomas Farrer's argument, if it means anything, the jam, confectionery, and biscuit trades were created by means of bounty-fed sugar, and depend for their existence on its maintenance. If it does not mean that it means nothing, and yet it is only necessary to put it in those words in order to show its absurdity. The facts are that just as much jam, confectionery, and biscuits were made (per head of the population) when sugar was double the price. This is easily proved by the annual consumption of sugar, which shows no more rapid increase now than it did then. There could not be a more conclusive proof of the entire absence of any foundation for the "jam argument," with all its ornamental accessories of the enormous quantity of sugar required and number of men employed by these industries, all depending for their very existence on the maintenance of bounties. As Sir Thomas Farrer puts it, with earnest solemnity, "are these industries which ought to be trifled with?"

Another assumption, equally astounding when put in plain language, is that if we abolish bounties "we put a stop to those manufactures of ours which we now export in order to pay for the bounty-fed sugar." This, if it means anything, must mean that whatever bounty-fed sugar is used in this country is used over and above the quantity which under normal conditions would be consumed. Thus stated, the point requires no further refutation; but if proof is required it may be found in the statistics of our annual consumption to which I have already referred. Sir Thomas Farrer will, no doubt, reply that he did not say that this would be the result of abolishing bounties, but of prohibiting them. But when he wrote the sentence from which I have quoted he overlooked what I had pointed out in reference to his former letter, that, as the visible production of the world is five million tons per annum, we shall continue to import whatever sugar we may want at the price ruling throughout the world, whatever may happen with regard to the remnant of bounty-fed sugar. Our consumers will continue to eat as much sugar, and, therefore, as much of our own manufactures will continue to be exported in exchange for it.

If I were not replying to letters which have been characterised as "weighty" by very high authority, I should feel constrained to apologise for wasting your valuable space in refuting such glaring fallacies.

Among more miscellaneous errors, which I will correct as briefly as possible, we come first to a repetition of what I had already met in my former letter, that the bounties are impossible to estimate. I will give one instance in disproof of this. France, in 1884, started a new bounty on production. This was done intentionally, not accidentally, as Sir Thomas Farrer asserts, and it is this, not the German bounty, as Sir Thomas Farrer says, which far eclipses all other bounties. Part of the system is that the French colonies shall receive exactly the same bounty as the mother country, and this is accomplished by ascertaining to a franc the amount of the bounty obtained each year in the French beetroot factories per 100 kilos. of sugar, and giving exactly the same amount per 100 kilos. to the French colonial sugar during the following year. What can be done in France can, of course, be done equally well elsewhere, the only data necessary for the calculation being the rate of duty and the yield of sugar. This is quite as accurately determined in Germany as in France.

On the point of cheapness, with which I have fully dealt, Sir Thomas Farrer makes a remark which is probably regarded as telling and unanswerable. He says producers are in a dilemma; the abolition of bounties will either make sugar dearer or it will not; and if not, it will be of no benefit to them. This I have already met in my general argument as to cheapness. It is only occasionally, and for very short periods, that the competition forces prices down to point at which producers lose, though with regard to refiners the process is a continuous one. The other influences brought about by bounties all tend to raise prices so far as production is concerned, consumers becoming more dependent every year on one particular crop; and as regards refined sugar, the cheapness is too small to be appreciable. It is the hindrance to progress and improvement and to the extension of cultivation which harasses producers quite as much as occasional depressions in the market, and it is for these reasons that they desire to be placed on equal terms with their competitors, if the mere fact of the inequality is not sufficient ground in itself for demanding abolition of bounties as a constitutional right.

In the effort to lay as much stress as possible on the word "cheap," Sir Thomas Farrer describes our sugar as so cheap that it is actually only half the price paid in the country of production. This is an absolute delusion. The price of sugar is the same all over the world; the only reason why it is dearer in some countries than in others is that in some it pays no duty, in others a low one, and in others a high one.

Sir Thomas Farrer asks, if we are going to abolish the sugar bounties, what are we going to do about shipping and other bounties? The answer is very simple. Do away with them if you can, in the interests of free trade.

The Board of Trade, he says, has enunciated the salutary doctrine that "Government should not interfere with the course of trade." Certainly, let us apply it to the case of the sugar bounties. The foreign Government interferes with the course of trade by giving bounties. If this interference operated only in its own country we should have no right to meddle with the matter, but as the effect is to interfere very seriously with the course of trade in this country by actually handicapping British producers and manufacturers in their own home markets, those producers appeal to the very principle laid down by the Board of Trade.

It is quite right that our Government should not interfere with the course—the natural course—of trade. How much more true must this be, and how much more strictly should the principle be enforced, when we come to the extraordinary instance of a foreign Government interfering with the natural course of trade in British markets. And yet, when the very natural method of putting a stop to so flagrant a violation of Sir Thomas Farrer's principle by friendly international agreement is attempted he resists it tooth and nail; first in the Board of Trade, then by leaflets of the Cobden Club, and lastly in four columns of *The Times*. "Let foreign nations take care of themselves," he says; "do not teach them that we are afraid of free imports." In this case the foreign nation is taking care of itself by handicapping British producers in their own markets, and Sir Thomas Farrer defends the process on principles of freedom and equality. Thus, the deeper we dig into his letters the further we get into the region of topsy-turvy. As in many other cases, Sir Thomas Farrer repeats a point which I had already fully met without taking any notice of my remarks. "If it is right," he repeats, "to retaliate on bounties, it is much more right to retaliate on protective duties." The error here is threefold. In the first place, as I have shown, the action as to bounties cannot by any straining of terms be called retaliation. Secondly, the conditions are entirely different. Bounties operate aggressively by protecting foreign producers in this country, whereas foreign protective duties are an internal arrangement of the foreign country with which we have no right to interfere. Thirdly, any attempt to interfere with foreign protective duties by retaliation would in nearly all cases prove futile, while the very act of levying the retaliatory duty would create the very protection which I entirely agree with Sir Thomas Farrer in condemning. But in dealing with the bounty the process is exactly the reverse. The protection takes place in our market by the action of the foreigner. The removal or prohibition of the bounty annuls the protection and restores free trade. The process is easy, effectual, and, in fact, the only way of securing a return to the condition of free imports which Sir Thomas Farrer so much desires but will not permit. In fact it is he who has perpetrated "the first official abandonment of that policy of free imports which has done so much for the material welfare of our toiling millions."

On all points, I have now, as in times past, met Sir Thomas Farrer on his own ground, "the paramount interest of the consumer," and I therefore trust that if he continues his crusade in favour of bounties he will first deal with my arguments thoroughly and in as straightforward a way as I have endeavoured to demolish his. The question of the rights of the producer, whether master or man, I have hardly touched; but I should think that a good deal might be said about British producers—masters and men—having a constitutional right to demand equality with the foreigner on their own markets. At present the foreigner decrees that British producers of sugar shall not sell their goods under natural conditions in their own markets. They are to submit to be handicapped even in their own country. This is what Sir Thomas Farrer defends on free trade principles, and the Cobden Club backs him up. It is probably the most remarkable instance of science turned upside down that was ever seen.

Mr. Gladstone has called public attention to Sir Thomas Farrer's arguments as being "weighty." They have now, in your columns, been thoroughly weighed and found wanting. And yet no one could be found more capable than Mr. Gladstone, in his scientific days, to test the weight of arguments and facts. I cannot believe that, even if our sugar question were unfortunately to be dragged into the arena of party strife, the delicate balances so often used by our former chief would be found to have lost their accuracy.

Sir Thomas Farrer asks me to reply to four questions, all of which are so fully answered in my former letters that I almost fear he has not devoted such careful study to my arguments as I have to his. The questions to which he challenges me to reply can only be answered by repeating in brief what I have already argued in full. Sugar producers suffer from bounties quite as much by being deterred from progress as by being undersold. The amount by which refiners are undersold is too small to have any appreciable effect on prices. These points are fully explained in my letter of the 5th inst.

The exclusion of bounty-fed sugar would have the effect of immediately abolishing the bounty. As we have constantly explained, it is solely for the purpose of giving security to the contracting Powers and bringing about a general abolition of bounties that this penal clause is required, and is, in fact, indispensable. The industry has never asked for "the exclusion of foreign bounty-fed sugar to benefit our own sugar producers." We have argued in favour of a penal clause only because the negotiations for the suppression of bounties cannot be successful without it, and we have shown, as the *Spectator* puts it, that such a clause "is not only consistent with free trade, but positively conceived in the interests of free trade."

Sir Thomas Farrer's third question is best answered by transcribing it. "If bounty-fed sugar is the only source of supply from which the enormously increasing demand of the world is being met, and we cut off that supply, how can we do so without obliging people to use less sugar, or to pay more for it than they would do if that supply were not cut off?" The answer is so evident that it is almost unnecessary to formulate it. It is the bounty we wish to cut off, not the supply of sugar. We wish to bring back the production and manufacture of sugar into natural conditions—in other words to restore free trade—and we are bold enough, in our faith in free trade, to believe that under natural conditions sugar will be produced in sufficient quantities to supply all the wants of the world, and at the very lowest price at which its production and manufacture can be carried on. If Sir Thomas Farrer, as a political economist, objects to that arrangement, he must object to it on protectionist, not on free trade grounds.

I am, Sir,
Your obedient servant,
GEORGE MARTINEAU.

City Liberal Club.

The *Times* of October 26th contains a long letter from Sir T. H. Farrer on "The Sugar Convention and its Protocols," which, for want of space, we are compelled to omit; and in its issue of October 29th is a letter also from Sir T. H. Farrer, dated October 24th, in reply to Mr. Martineau, and on October 30th, a letter from Mr. George Shute, dated October 22nd in reply to Sir T. H. Farrer, which, for the same reason, we cannot insert this month.

On November 1st Baron H. de Worms, M.P., is to receive an address from the sugar refineries at Greenock, and no doubt, in his reply, he will have something to say in reference to Sir T. H. Farrer's remarks upon himself and the sugar Convention.

THE CONSEQUENCES OF THE SUGAR CONVENTION.

By J. Görz.

In addition to the defects and difficulties inherent in the Convention itself, there are further to be considered the consequences which must necessarily result from its being carried into effect.

The statement has already been made, that of late years both beet and cane sugar manufacturers have been able to sell their production at prices which left a greater or less profit, the amount being conditioned by their agricultural and technical positions. It would be a totally erroneous conclusion to assert that the larger profits are confined to the beet sugar industry. In both industries indifferently, large and small profits, and also losses, can be shown, so that on the whole we may conclude, that the present situation cannot be characterised as especially favourable or unfavourable for either.

By the abolition of bounties the European beet sugar industry will naturally be weakened to the extent of the amount of the bounties; *i.e.*, the cane sugar manufacturers will be placed in a position to continue to offer and sell their sugars at a profit, whilst the beet sugar manufacturers will be compelled to recoup themselves by higher selling prices for at least a portion of the loss suffered by sacrificing the bounties. Consequently the ability of the cane sugar to compete will be very considerably increased, and it may be regarded as certain that the amount of the bounties will represent the sum which will go to enable cane sugar manufacturers to advance towards perfection in the path of agricultural and technical progress. The European industries will furnish the colonies, &c., with the capital required to perfect their operations, and enable them to become formidable competitors of the European manufacturers.

One need only read the journals which are published in transatlantic and other cane-sugar producing countries, to see how they place all their hopes on the coming into effect of the Convention, and how they are quite clear that the carrying out of the Convention will at once give rise not only to an improvement in working, but also to the establishment of new factories and increased planting of cane. One need further only listen to what is being said in the mother countries of the colonies, which have capital invested in the cane sugar industry, to find that the universal opinion is that with the coming into operation of the Convention the present very low credit of the colonial producers will again be considerably strengthened, and to see how ready those mother countries will, in that case, be to place the needful capital at the disposal of the colonies for perfecting all their arrangements.

The natural result, on the other hand, must be that the owners of capital invested in the beet sugar industry will, in face of such a state of things, become much more cautious than hitherto, and that, besides the direct loss from the abolition of bounties, the European manufacturers may easily lose in addition a large portion of their credit. Hence the coming into operation of the Convention means for the cane sugar manufacturers a gain in prices on sales, the possibility of easily obtaining the necessary capital for improving and increasing their operations, and an improved credit; on the other hand, for the beet sugar manufacturers a loss in prices and therewith undoubtedly diminished credit, and hence an obstacle to that further advancement in agricultural and technical matters which has only been necessitated by the loss in prices.

It may here be repeated, that the idea that the European beet sugar manufacturers could easily make good the loss of the bounties by means of less expensive and improved methods of working, is totally incorrect. They will be compelled to think out and discover, *de novo*, everything which will put them in a position to work better and more cheaply, and it is a well known fact that the means required for this are all the greater in proportion to the extraordinarily advanced position which they already occupy in this respect. On the other hand, it will be much more easy for the colonies to introduce cheaper and better methods, as for the most part they will only need to imitate the progress already achieved by the European industries in cultivation and technical treatment.

Under these circumstances the production of cane sugar must increase rapidly from year to year; indeed the greater yield of sugar obtained from the cane will of itself alone suffice to cause a large increase in the amount of cane sugar appearing on the world's market. Take with this the increased cultivation of the cane which has already been prospectively spoken of and partially undertaken by the colonies, and also the improvement of the quality of the cane itself, which has already been begun, then, in the course of no great number of years, such quantities of cane sugar will come into the world's market as to render the competition on the part of beet sugar very difficult if not impossible to maintain.

The reverse may, and will happen of that which happened at the beginning of the present decade, when, quite unexpectedly, as far as the cane producing countries were concerned, the produce of the beet growing districts largely increased, and thereby placed the cane sugar makers in a position of exceeding difficulty.

The latter were able to extricate themselves from this crisis, because they possessed an exceedingly rich raw material and were able to improve their method of working, but in a similar crisis, which may occur later on, the beet sugar manufacturers will not be able to help themselves in this way, and the time will and must inevitably come when the individual countries will be obliged to support their industries, if they intend that they shall be maintained, no matter whether there is at the time a Convention in existence or not.

If the colonies are so supported by the Convention that they are enabled to develop themselves in a similar manner to the beet sugar industry, as regards cultivation and technical operations, and both industries will thus be working under equal conditions as regards those points, then the accuracy of the statement made at the outset of these remarks will be clearly proved, viz. :—*It is an indispensable condition of the maintenance of the European beet sugar industry that the deficiency in sunlight and heat with which the beet has to contend in comparison with the cane, should be compensated, and the best solution of the problem is found in a system of fiscal legislation which renders possible the obtaining of bounties.*

The foregoing remarks are primarily applicable in case the Convention should come into operation with the adhesion of all the European States concerned in the matter. Disturbance of the distribution of supply would in this case take place at first only in the direction of the exclusion of non bounty-fed beet sugar from the transatlantic and similar markets of which it had hitherto held possession. Later on, the cane sugar, owing to the more favourable conditions enjoyed by it, would endeavour to gain possession also of the market in the European non-producing countries.

But an immediate alteration in the distribution of supply must, however, take place, if only a portion of the European countries should take part in the Convention, the remaining portion continuing to grant bounties on the sugar produced within their borders. It would be no difficult task to show, that in that case the latter would have a great advantage. The countries remaining outside the Convention would undoubtedly be the best able to compete in foreign markets of consumption, so far as the latter did not belong to the Convention. But of these foreign markets only England and the English colonies belong to the Convention, whilst all other similar markets would allow entrance to bounty-fed sugars on the same conditions as those without bounties. To these belong the United States, which alone are obliged to import more sugar than England, in the same category are found also the very important South American and North African countries, as well as the South European and the Western Asiatic. In all these countries the bounty-fed sugars will be able to be offered and sold cheaper, and it will not be long before the non-bounty giving countries will be completely driven out of the markets where they had hitherto supplied part of the demand, and fully delivered over to the tender mercies of the English consumers. Thus France, for example, would be very stupid if she were to take part in the Convention, supposing it really to become a *fait accompli*. She will be able to drive the German, Dutch, and English competition out of South America, the Austrian out of the Mediterranean, and to find a market more than sufficient to furnish a compensation for that of England and her colonies.

But every other European country which modestly leaves it to others to enter the Convention, even running the risk of being declared under ban by the high college of the Convention, will find itself in a similar position. There is everything to gain and nothing to lose by so doing.

That excellent maxim of political economy, that the aim of every industry must be to increase its sales as much as possible, and not merely hold its own, but endeavour to find new outlets for its production, will, for the countries so put under ban, be actually carried into effect, and become a veritable gold mine to them ; the others will have to enjoy it in theory, and practically be compelled to put up with the situation.

This first disturbance of the supply will inevitably have the result that the non-bounty fed sugar will be forced to turn to England as its almost exclusive market, and compete there with the materially strengthened cane sugar. Then will England, for the first time, be able to play off cane sugar against beet sugar, and the supposed advantage of the beet sugar industries in question, which think they will have attained Paradise by securing the English market, will, seen in broad daylight, prove to be for them an incalculable injury, but for England an evidently foreseen and right profitable achievement. But as a matter of political economy it is an absolute monstrosity to tie any industry by treaty to one single market and close to it all the others. It follows that by abolishing the bounties as contrary to sound political economy we shall be driving out Satan by means of Beelzebub; the simple difference will be that those industries, which were formerly doing tolerably well, will afterwards be in a suffering state.

But the non-bounty fed sugars will also be driven out of the great market of the United States, towards which the excess, not taken up in England, will most likely endeavour to turn itself. For that market the insignificant freight to England, which favours the beet sugar, at once falls out of the question. The freight will come as high as that for sugars from the Central and South American districts, the natural source of supply for North America. But then the beet sugar, weakened in its competing power by the loss of the bounties, will be less able than before to meet the cane sugar, as the latter, strengthened to the extent of the amount of the bounty, can be delivered cheaper. The improved position of the cane sugar industries will, on the other hand, contribute to the requirements of the North American market being fully supplied by them, and to the holders of non-bounty fed European sugars losing all desire to regard the United States as a market which makes them more independent of the good or ill will of England.

Now, suppose the case occurs, that in consequence of the large amount of sugar offered in the English market, prices become considerably depressed, and the English Colonial sugar-producing districts, most of which (as, for example, the East Indies) are capable of an enormous increase on their present production, begin again to suffer, *i.e.*, to complain of the competition of foreign sugars in the market of the mother country;—England will hardly hesitate to give notice of withdrawal from the Convention, and to take steps for the protection of her colonies, which will then probably be able to supply all that is required for English consumption. The adherents of the Convention, thus turned adrift, would have to occupy the well-known seat between the two stools, in addition to having been turned out from the other markets which they had previously possessed, if the Convention, after a few years existence, should come to its well-merited termination.

As to the permanent International Commission which is fore-hadowed by the Convention, such an institution can never offer any guarantee that those countries which remain faithful to the treaty shall be immediately and at once protected against breaches of the Convention on the part of one individual country, and yet this is the first thing which must be securely provided against.

Whether England, after the Convention came into operation, would have cheaper or dearer sugar is a question which does not here concern us, inasmuch as England in this matter is in opposition to the European industries, and they are not required to occupy themselves with the interests of that country and its inhabitants. The universal opinion in commercial circles seems, however, to be, that at first a rise in the price of sugar would take place, and continue so long as the cane sugar industries were not powerful enough to supply to a great extent the requirements of England, as was formerly the case, and she therefore still had need of beet sugar. But as soon as the former came permanently in increased quantities into the English market, a fall in prices might certainly be expected, and then the European beet sugar manufacturers, in so far as they had joined the Convention, would be the first of all to suffer.

That it does not requre much to cause such a depression of prices has been plainly shown during the spring of this year. An excess of exports of Brazilian sugar to England amounting to between 40,000 and 50,000 tons was sufficient to create a greater flatness in the English market than was warranted by the statistical position. As is well known, the beet sugar industries were the first to suffer from this. But the assumption that in the countries joining the Convention and the colonies far more sugar is at present being produced than is required to supply the English market, is certainly an unfounded one. The fact is overlooked that the present production of the world about corresponds with the consumption, and the diversion of all these quantities to England would strip the other hitherto existing very important markets entirely of sugar, which means, would force them to pay higher prices. In this way this export of sugar to England alone would already come to an end at its very beginning.

However, as already remarked, it is no affair of the friends of the European industries to trouble themselves about the interests of England, or her cheaper or dearer supply of sugar in consequence of the Convention.

A further inevitable result of the Convention may be mentioned in a few words. Through the provisions more especially of Article VIII., but also in consequence of the other provisions, it may easily happen that owing to the accession of individual countries to the Union, or to their retirement from it, or to the decisions of future conferences, the legislative body would be continually having to deal, from one year's end to another, with alterations in the laws relating to taxation. But the effect which constant or even only frequent changes in legislation produce on any industry is too well known to need further remark.

Many other consequences of the Convention might be pointed out which must have an injurious effect on trade and industry. But what has already been said appears to be amply sufficient to prove how little claim the Convention can have to be called an institution corresponding to the interests of all the contracting parties, and really susceptible of being practically carried out. It is a one-sided got-up affair for the benefit of the cane sugar and the English refiners; it will, if it ever comes into effect, be an obstacle to trade and industry, but it is in its very constitution an abortion, which already bears the stamp of death clearly impressed on its forehead. Theoretically regarded it is certainly a very charming object.

The Duty of the European Beet Sugar Industry in regard to the Convention.

From what has been said, it is plain that in the Convention the question principally resolves itself into "cane *versus* beet," and it appears self-evident that the fight against the Convention must be undertaken in common by the European beet sugar industries injuriously affected by it. Even though these industries may be competitors in the world's market, each endeavouring to get the better of the other, this internal contest must be entirely left out of sight in the battle with the common foe. The attempt to bring the European industries more strongly into opposition one with the other, by means of the Convention, must not be allowed to have the result which England and the Colonies desire.

As regards the adoption of equivalent legislation, viz., a common rate of taxation and identical legal yields and allowances on export, it will not be possible to find a common basis in this direction, because the other conditions under which the industries are carried on in the different countries are too dissimilar. Still it must not be assumed as certain that no agreement ever will be arrived at in this direction. Such questions are, however, too dependent on other factors which concern the various governments individually, for any action in this direction to be of any practical value, even if an agreement were arrived at.

But it is quite different with the principle of the legislative standpoint, and it would seem that in this direction the concerted action of all the manufacturers might, without much difficulty, lead to a result which would and must find a hearing with the governments concerned.

Stress should be laid, energetically and with one accord, on the fact that the beet sugar producing countries require, as a weapon against the competition of the cane, favoured by nature as it is with much superior surroundings, a fiscal legislation which in principle admits of a bounty, as a compensation for those advantages; which would allow tolerably wide limits, according to the circumstances of the national exchequer, as regards the bounties; but which would, at any rate, prevent the cane sugar from gaining the upper hand, as it undoubtedly will do without such legislation, to the great injury of the beet sugar.

The materials for demonstrating the necessity of this claim, which is simply a dictate of self-preservation, can be got together, without difficulty, by united action. Though the consequences of such a convention, as far as concerns the struggle between beet and cane, might not make themselves felt in their full extent at once, but only after the lapse of some years, yet it seems to be the duty of the existing manufacturers to take care that their industries are maintained in full vigour, and so transmitted to the coming generation.

THE PROPERTIES OF SACCHARIN.

The *Journal de la Chambre de Commerce de Constantinople*, for the 15th September last, commenting on the results of an inquiry recently conducted in Paris as to the actual properties of saccharin, says:—

" Efforts have for some time been made to generalise the use of a new artificial sugar known under the name of saccharin.

"This product, extracted from coal, and principally made in Germany, is not, it appears, without some dangers for the public health.

"In consequence of numerous complaints, the Consultative Committee of Hygiene at Paris was requested to examine saccharin, considered both as a food and as regards hygiene.

"A Commission, composed of Doctors Brouardel, Pouchet, and Ogier, was appointed with the object of drawing up a report, at the desire of the Minister of Commerce. The Committee of Hygiene has lately met to hear the reading of this report, the conclusions of which it has approved, and which we proceed to analyse.

"Generally, say the reporters, materials which are antiseptic or capable of preventing fermentation, materials interesting from a therapeutic point of view, should not be introduced into food. It should be borne in mind that a substance is only a food on condition of its being able to undergo in economy all the series of changes which render it assimilable. Not only, continue the reporters, is saccharin not a food, but moreover, by its antiseptic properties, it renders entirely unalterable the substances with which it may be mixed.

"To replace sugar by saccharin is to suppress an article of food in order to replace it by an inert body; it is to check or retard the physiological actions which produce the change into sugar of the amylaceous materials; it is, in short, to expose on its own accord the organism to a double deficit. The delay affected in the change of the fibrin, of the albumen, is not clearly shown. These are the reasons which have led the Commission to the conclusion that saccharin should not be introduced into food. The Commission has replied as follows to the questions submitted by the Minister of Commerce—

"1. Saccharin is not an article of food, and cannot replace sugar.

"2. The use, in food, of saccharin or of saccharinaceous preparations suspends or extends the changes of the amylaceous or albuminous substances in the digestive tube.

"3. These preparations have the effect of seriously troubling the digestive functions. They are such as to increase the number of affections designated under the name of dyspepsia.

"4. The use of saccharin is still very recent, so that the consequences of a diet, in which saccharin would enter daily, may be very easily determined; but henceforth it is well established that its use has an injurious influence on digestion, and we are perfectly justified in concluding that saccharin and its various preparations must be prohibited as articles of food."

The *Journal de la Chambre de Commerce de Constantinople* adds that at the moment of going to press it learns that the Portuguese Government has prohibited the introduction of saccharin into that country.

AWARDS OF PRIZE MEDALS TO JENSEN'S GUANOS, &c.

Messrs. J. Jensen & Co., Limited, are to be congratulated upon their success at the Exhibitions of 1888, in which they have exhibited their manufactures.

For their well-known Guanos (which are used largely for the sugar cane), Cod liver oils, Leather dressing oils, Cattle oils, and Preserved fish, they have been awarded as follows:—

GUANOS.—Le grand Diplôme d'honneur (the highest possible award), at Ostend; Le grand Diplôme du Mérite (the highest possible award), at Brussels. For horticulture—The Gold Medal at Brussels, and the Silver Medal at Bordeaux.

OILS.—The Silver Medal at Brussels.

FISH.—Le grand Diplôme d'honneur (the highest possible award), at Brussels.

Besides these Messrs. J. Jensen & Co., Limited, have been awarded at Brussels Le grand Diplôme d'honneur, the highest possible distinction, for the general excellence of all their manufactures.

We may also quote the following paragraph from the well-known *La Gazette* of Brussels:—

"We should mention that the company J. Jensen & Co., Limited, of the Lofoden Islands, occupies in the Norwegian Court of the Brussels Exhibition a hall which is one of the most interesting, in consequence of the products there exhibited. The guanos made from the fisheries of the north are dried, pulverized, cleaned (*i.e.*, all fatty matter is extracted), and delivered at prices, and in such a condition, that one may safely predict that they will soon hold a large place in the consumption of European agriculture."

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. Thompson, C.E., F.C.S., M.I.M.E., Patent Agent, 6, Lord Street, Liverpool; 6, Bank Street, Manchester; and 323, High Holborn, London.

ENGLISH.

APPLICATIONS.

13534. J. Grass, G. C. Heilemann, and O. Ohme, London. *Improvements in the manufacture of saccharine liquors for brewing and other purposes.* (Complete specification.) 19th September, 1888.

13595. J. G. Lorrain, London. *Improvements in the treatment of sugar solutions.* 20th September, 1888.

13655. D. Stewart, Glasgow. *Improvements in centrifugal apparatus for drying sugar or other granular matters.* 21st September, 1888.

ABRIDGMENT.

14500. Anthony Stevenson, of 10, Grosvenor Park Road, Chester. *Improvements in grinding and pulverising sugar, salt, and other like material, and in apparatus or machinery therefor.* 25th October, 1887. Consists of a metal roller, with a series of saw-tooth grooves (preferably about 20 to the inch) cut along its sides, which, when the sugar comes between them and the sides of the hopper, cut off a strip of material, which breaks up into granules. Phosphor bronze is the metal preferred for the roll, which works more easily and with less shock if the grooves thereon follow a slightly spiral direction.

10216. Henry Gugemheim, of the firm of Gugemheim & Grass, of No. 109, Cleveland Street, Fitzroy Square, in the county of Middlesex, merchants. *Improvements in the manufacture of saccharine liquors for brewing and other similar purposes and in the mode of their manufacture.* July 13th, 1888. The so-called saccharine hitherto employed for brewing purposes had about the following composition: sugar, 40; water, 49; soap, 1; foreign, 10 per cent. The improved liquor is composed of—sugar, 20 to 25%; water, 80 to 75%. To prepare it sago, tapioca, rice, or maize flour is mixed with cold water and a small quantity of sulphuric acid is added thereto. The mass is treated with steam in a conveyor till conversion is completed, and about 2% of whitening is then added to neutralize. After filtering to free from the insoluble precipitate (sulphate of lime) and refiltering through animal charcoal to purify from organic matters, the solution is ready for use, Instead of the above-mentioned flours, jaggery or palm sugar may be employed, and the process modified accordingly.

AMERICAN.

ABRIDGMENTS.

380050. W. H. Odell, Yonkers, New York. *Evaporating coil.* March 27th, 1888. The claim is as follows: "In an enclosed coil, the "combination of separable sections composed of one or more tubes "united to hollow headers, with removable return-bends connecting "the said separable sections, and establishing communication "between the same; said return-bends having means for a ready "attachment or detachment to said headers (as by forked lugs and "swivelled bolts)."

383384. Homer T. Yaryan, of Toledo, Ohio, U.S.A. *Vacuum distilling apparatus.* May 22nd, 1888. Partly improvements on his patent 355289. The chief objects of this invention are:—1st. To provide extended vaporizing coils or conduits, and increased heating surfaces, and improved means for feeding the liquid whereby each set or coil of tubes receives a positive and uniform feed. 2nd. To positively control the amount of liquid fed by the pump to the evaporating coils. 3rd. To provide improved separating chambers at the discharge end of the vapourizing coils, to better free the vapours from solid and liquid particles. 4th. To successfully treat frothy liquids, which usually cause so much trouble by priming.

384772. Thomas Makemson, of Mound City, Kansas. *Evaporating pan.* June 19th, 1888. This inventor provides an inner pan or pans (supported in the ordinary pan on legs or slotted division plates), which will receive the partly evaporated or thick liquor, and thus prevent direct contact with the outer heated surface, and consequent burning.

385234. Leopold Bon, Guantanamo, Cuba. *Machine for cutting sugar cane.* June 26th, 1888. This machine is intended for cutting sugar cane into small pieces with rapidity and without waste. It is provided with two oppositely rotating shafts, carrying a series of overlapping saws, and two oppositely arranged inclined chutes for guiding the cane between said saws from opposite sides. The passage of the cane down the chutes may be regulated by means of two inclines, pivoted at their upper ends between the chutes, and adjustable with relation thereto at their lower ends.

389075. John J. Hayes, of Brooklyn, New York. *Apparatus for evaporating and condensing liquids.* September 4th, 1888. Consists of a vertical, cylindrical pan, divided by horizontal diaphragms into three chambers. The upper and lower compartments, which contain the liquor under treatment, are connected by a series of pipes arranged in pairs (one within another) in such a manner as to facilitate circulation. Steam is admitted by a coiled pipe placed in the lower chamber, and thence passes into the middle one where it surrounds the pipes and heats the liquor therein. Means for feed and withdrawal, also peepholes and a guage, are provided. The vapour escapes through an outlet at top.

389160. William Marr, of New York. Assignor of one half to Charles K. Dutton, of same place. *Evaporating apparatus.* September 4th, 1888. This inventor provides an apparatus by means of which purified cold air is forced into the heated liquor. As it passes through it absorbs heat and moisture, which are carried off with it. Its flow may, if desired, be assisted by a second supply of air. Two forms of plant are shown; the one for ordinary evaporation or concentration, and the other for use where it is desired to condense or retain the vapours evolved.

43804. Leopold May, Ung. Ostra. *Apparatus for the production of bar and cubic sugar.* 5th November, 1887. The sugar mass is placed between boards provided with small plates of an elastic material. The boards are fastened firmly to the main frame of the apparatus. When the sugar strips are ready to be taken out, one part of the apparatus is moved in one direction, and the other part in the opposite direction. The pressure of the elastic plates brings the wooden planks together; the sugar is thus released and can be taken out in strips.

GERMAN.

ABRIDGMENTS.

43993. A. Carr, Brussels. *Improvements in drying apparatus for fresh beetroot, beetroot shreds, and other matter.* 17th September, 1887. On the inside of an apparatus in the shape of a vertical cylinder, belonging to a class called "plate drying apparatus," there are a number of sieve plates suspended in a slanting direction, and over these brushes are arranged. When the middle cylinder is revolved, the beetroot shreds are forwarded by these brushes from one sieve plate to the other. An up and down jerking motion is simultaneously imparted to the cylinder and to the sieve plates.

44481. Selwig & Lange, Brunswick. *An apparatus for cutting beetroot in a machine with a horizontal cutting blade.* 26th February, 1888. Above the feeding pan there is a receptacle with a slanting bottom, at the lower end of which is an opening through which the beetroot falls. This receptacle revolves in a vertical axis, and so distributes the beetroot in equal along the horizontal cutting blades.

385939. J. W. Lloyd, of Cincinnati, Ohio, United States. *Apparatus for evaporing liquids.* July 10th, 1888. This invention relates to improvements in apparatus for evaporating or concentrating liquids and solutions, the object being to provide an apparatus that will be simple and inexpensive in its construction and efficient in its action. The form of apparatus shown consists of a shallow circular metal dish or receptacle, divided into two parts by a horizontal diaphragm. Upon this diaphragm is helically coiled a ribbon plate (so as to form a worm) which is open above, but when the apparatus is in operation closed by a lid. The liquor to be evaporated or concentrated is fed into the worm at its outer edge by a big pipe, and travels along to the centre where it is withdrawn by an outlet pipe. A blast of air or suitable vapour or gas, heated or cold, is drawn or forced through the helix in the opposite direction to that in which the liquor flows, and, travelling over the surface of same, absorbs the aqueous vapour from it. The under chamber of the apparatus is provided with inlet and outlet pipes for the circulation of steam or hot air or water for the purpose of heating the liquid under treatment. Some of the advantages of this apparatus are its cheapness, compactness, the great area of evaporating surface, and the ease with which it can be opened for cleaning or examination of contents. The improved filtering agent can be impregnated with various substances (such a salum, &c.,) previous or subsequent to carbonization. It can then be applied in various ways.

386579. Gottfried Engle, of Brooklyn, New York, assignor to Henry F. Engle, of same place. *Vaccum Pan.* July 24th, 1888. This invention relates chiefly to the mounting of the "radiators" or steam pipes in a vacuum pan in such manner that their joints are not affected by expansion and contraction, that the bolts by which they are held are not subject to corrosion, and so that they can be removed one at a time for renewal or repair. The radiators are arranged horizontally in the form of concentric segments of circles (preferably semi-circles) attached at each end to main steam ways ("heads.") It is preferred to arrange the radiators (which are of smaller diameter than usual) in two tiers close together, which are surmounted at suitable intervals by similar tiers, preferably about five in all, according to the height of the pan. This invention likewise provides for heating different parts of the contents of one pan to different degrees of temperature by which the circulation of same is promoted. The exhausting apparatus does not differ from that ordinarily employed.

386788. GEORGE C. ROBERTS, of Chicago, Illinois, assignor to THE TROY LAUNDRY MACHINERY CO., of Troy, New York. *Centrifugal machine.* July 24th, 1888. This invention relates chiefly to details of centrifugal machines, more especially with reference to the mounting and bearings of same and provides for a limited spring pivotting of the main vertical axis in such manner that the cage of the machine shall revolve around its true centre of gravity. An annular cushioned auxiliary bearing is also provided around the upper portion of the shaft, which comes into action in the event of the usual one being fractured and thus prevents greater damage. Details of adjustably mounting guide pullies for the power transmitting belt or strap are also given.

E. B. EVERINGHAM, Warsaw, New York, assignor to the Variety Machine Company, of same place. *Sugar evaporator.* August 28th, 1888. This invention relates to improvements in sugar arches in which evaporating pans are used, and having the heat applied underneath the same, and being more especially adapted for employment in the production of sugar from the sap coming from maple trees. The claim is as follows:—"The combination, with the evaporator "arch, of the supplementary heater underneath the pan at its rear "end and below the smoke exit flue, the supply receptacle, the flexible "pipe connection, the heater inflow pipe, the removable cap collar "screw-threaded upon the heater, the discharge pipe attached to the "collar, and the stop-cocks for regulating the flow of the fluid."

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

The Sugar Cane has a wide circulation among planters in all sugar producing countries, as well as among refiners, merchants, commission agents, and brokers, interested in the trade, at home and abroad.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

JANUARY 1ST TO SEPTEMBER 30TH, 1887-1888.

Board of Trade Returns.

IMPORTS.

RAW SUGARS.	QUANTITIES.		VALUE.	
	1887.	1888.	1887.	1888.
	Cwts.	Cwts.	£	£
Germany	4,749,653	3,305,823	2,603,416	2,152,044
Holland	319,133	232,962	172,434	149,501
Belgium	552,106	439,982	292,419	279,876
France	48,181	13,397	27,824	9,793
British West Indies & Guiana	1,923,932	1,821,450	1,349,723	1,445,887
British East Indies	453,277	940,888	207,246	454,687
China and Hong Kong	312	10,733	201	6,420
Mauritius	104,067	189,988	56,960	128,691
Spanish West India Islands	174,758	304,376	108,130	223,412
Brazil	646,074	2,118,638	342,462	1,332,963
Java	2,785,115	3,038,206	1,802,278	2,286,185
Philippine Islands	317,324	545,824	143,610	261,614
Peru	307,876	363,961	187,941	269,183
Other Countries	431,876	600,819	244,051	436,747
Total of Raw Sugars	12,813,684	13,927,047	7,538,695	9,437,003
Molasses	270,440	315,415	88,080	97,681
Total Sugar and Molasses	....	....	7,626,775	9,534,684
REFINED SUGARS.				
Germany	1,900,899	2,190,552	1,452,135	1,910,845
Holland	1,054,566	1,028,584	815,359	932,236
Belgium	150,617	150,605	124,336	143,860
France	1,114,395	575,002	836,785	525,629
United States	773,767	40,162	619,631	37,450
Other Countries	78,489	389,711	55,920	309,895
Total of Refined	5,072,733	4,374,616	3,904,166	3,859,915
EXPORTS.—REFINED SUGARS.				
	Cwts.	Cwts.	£	£
Sweden and Norway	57,438	57,530	40,411	47,585
Denmark	86,839	68,791	48,869	50,318
Holland	53,885	64,233	35,847	46,771
Belgium	30,469	21,124	18,469	14,908
France	26,187	5,445	16,308	3,827
Portugal, Azores, & Madeira	65,406	54,667	38,304	40,085
Italy	67,437	66,575	42,657	49,102
Other Countries	140,863	145,053	96,319	114,536
Total of Refined	528,524	483,418	337,184	367,132

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of September, 1888, compared with the corresponding month of the two preceding years, and the average monthly imports for the year compared with those of 1885, 1886, and 1887, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country :—

Countries from which Sugar has been imported.	"Lumps and Loaves."							"Other Sorts." Including Crushed Loaf, Granulated, Crystallized, &c.							Total.						
	Monthly Average.				Sept.	Sept.	Sept.	Monthly Average.				Sept.	Sept.	Sept.	Monthly Average.				Sept.	Sept.	Sept.
	1885	1886	1887	1888	1886	1887	1888	1885	1886	1887	1888	1886	1887	1888	1885	1886	1887	1888	1886	1887	1888
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
France	1597	1462	1363	1658	644	1087	873	463	2688	5099	1536	1447	2363	927	2060	4150	6462	3194	2091	3450	1800
Holland	3848	3508	3780	3227	3820	2827	2869	1472	1428	2483	2487	1325	2457	2146	5320	4936	6263	5714	5145	5284	5015
Germany & Austria	808	990	1347	1387	851	617	638	3262	6634	10463	10783	4563	6377	6111	4070	7624	11810	12170	5414	6994	6749
Belgium	189	344	592	612	375	724	517	120	113	308	225	59	299	183	309	457	900	837	434	1023	700
United States	707	854	454	11	976	240	..	8869	5078	2804	213	5900	438	10	9576	5932	3258	224	6876	678	10
Russia	..	..	3	..	..	..	..	875	3412	452	2163	..	1155	328	875	3412	455	2163	..	1155	328
Other Countries	1	..	..	1	4	..	..	24	9	15	1	..	..	8	25	9	15	2	4	..	8
Total	7150	7158	7539	6896	6670	5495	4897	15085	19362	21624	17408	13294	13089	9713	22235	26520	29163	24304	19964	18584	14610

SUGAR STATISTICS—GREAT BRITAIN.

TO OCTOBER 27TH, 1888 AND 1887. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1888.	1887.	1888.	1887.	1888.	1887.
London	34	52	258	265	239	241
Liverpool ..	99	85	272	221	287	229
Bristol	1	1	40	49	37	47
Clyde	19	36	205	191	181	191
Total ..	153	174	775	726	744	708
	Decrease.. 21		Increase.. 49		Increase.. 36	

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

FOR THE FOUR PRINCIPAL PORTS. IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND. FOR SEPTEMBER, 1888 AND 1887.

	STOCKS. October 1st.		DELIVERIES. In September.		IMPORTS. In September.	
	1888.	1887.	1888.	1887.	1888.	1887.
New York	50	97	73	75	55	35
Boston	6	15	15	13	10	13
Philadelphia....	1	1	14	10	13	10
Baltimore	..	..	..	..	..	..
Total......	57	113	102	98	78	58
	Decrease.. 56		Increase.. 4		Increase .. 20	
Total for the year (1888)..			860	925	869	936

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE 30TH SEPTEMBER, FOR THREE YEARS, IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts.*	TOTAL 1888.	TOTAL 1887.	TOTAL 1886.
180	70*	5	16*	11*	13	295	399	502

*Estimate.

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING 30TH SEPTEMBER, IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts.*	TOTAL 1888.	TOTAL 1887.	TOTAL 1886.
1233	428	44	424	229	348	2706	2661	2426

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROP, OF THE THREE PREVIOUS CAMPAIGNS.

(From Licht's Monthly Circular.)

	1888-89. Tons.	1887-88. Tons.	1886-87. Tons.	1885-86. Tons.
France	500,000	391,258	486,443	298,407
German Empire	1,025,000	942,441	1,012,968	838,131
Austro-Hungary	600,000	408,565	523,060	377,032
Russia and Poland.	475,000	430,000	479,582	537,860
Belgium	137,500	135,000	132,570	88,421
Holland	45,000	36,000	32,263	21,244
Other Countries	67,500	56,050	56,050	55,500
Total	2,850,000	2,399,314	2,722,936	2,216,595

Mr. Görz's latest estimate for 1888-89 crop is 2,620,000 tons, or 230,000 tons less than that of Mr. Licht's, viz. :—Germany, 45,000 ; Austria, 50,000 ; France, 10,000 ; Belgium, 42,500 ; Russia, 35,000 ; and other countries 47,500. Total, 230,000 tons.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

There has not been any decided alteration in the price of raw sugars during the past month. 1½d. to 3d. per cwt. represent the variations. Beet, 88% is now quoted at 13s. per cwt., whilst for forward delivery the prices are: November to December, 12/7½; January to March, 12/9.

Mr. Licht has not altered his estimate of the European beet crop, 1888-89, which remains at 2,850,000 tons. Mr. Görz estimates the crop at 2,620,000 tons, or 230,000 tons less than Mr. Licht's figures. There are those who "have no reasons to doubt," but whose wish, we imagine, is father to the thought, that the crop will be 3,000,000 tons.

Stocks of sugars in this country are decreasing; as compared with a year ago, they are some 20,000 tons less, whilst the stocks in the United States on the 1st October were only 57,000 tons against 113,000 tons on 1st Ocober, 1887.

There has been a good demand for refined sugars all through the month.

The imports of foreign refined for September were 14,610 tons, against 18,584 tons for September, 1887, and for the nine months, January to September, 218,744 tons, against 253,624 tons in 1887.

The deliveries of sugar into the United Kingdom (four principal ports) from 1st January to 27th October, as compared with the same period of 1887, show an increase of 48,975 tons, and the imports an increase of 35,597 tons.

The stocks of sugar in the United Kingdom on the 27th October were 153,142 tons, against 173,918 tons in 1887, or a decrease of 20,776 tons.

Present quotations for the standard qualities, as under, are:—

Floating.			Last Month.
Porto Rico, fair to good Refining	13/6 to 14/-	against	13/6 to 14/-.
Cuba Centrifugals, 96°/o polarization	16/3	,,	16/-
Cuba Muscovados, fair to good Refining..	13/9 to 14/-	,,	13/6 to 14/-.
Java, No. 15 to 16, good to strong	16/6 to 16/9	,,	16/6 to 17/-.

Landed.			Last Month.
Madras Cane Jaggery..	9/- to 9/6	against	9/3 to 9/6.
Manila Cebu and Ilo Ilo	9/- to 10/-	,,	9/- to 9/6.

Paris Loaves, f.o.b...	17/6 to 18/3	against	18/6 to 18/9.
Titlers	19/3	,,	19/9
Tate's Cubes	21/-	,,	21/6
Austrian-German Beetroot, 88°/o f.o.b..	13/-	,,	14/3 (prompt).

THE

SUGAR CANE.

No. 233. DECEMBER 1, 1888. Vol. XX.

☞ The writers alone are responsible for their statements.

N.B.—All communications to be addressed, and Cheques and P.O. Orders made payable to Henry Thorp, Ducie Chambers, 57, Market Street, Manchester.

For Scale of Charges for Advertisements, see page xi.

For Table of Contents, see page iii.

Mr. Henry Tate has signified, through the Earl of Derby, his intention of giving £16,000 (in addition to his previous gift of £5,000) for the erection of the library block of the Liverpool University College. At the suggestion of the Earl of Derby, it was resolved to associate Mr. Tate's name with the new college library.

We have nothing further to report about the "Electric Sugar Refining Company" beyond the fact that the $100 shares, which a month ago were quoted at 85, are now quoted at 93, with 90 bid.

In *The Sugar Cane* for August, 1887, page 397, we gave an interesting report by Mr. Quintin Hogg, upon the experiments he had been making with "diffusion" on his *Nonpareil* plantation (Demerara). The result, at that time, was not satisfactory—certainly not conclusive.

We are now informed that the diffusion battery has proved such a success that Mr. Quintin Hogg has decided to replace the cane mills at *Bel-Air* and *Reliance* with diffusion batteries. Two straight batteries with three cane cutters, with horizontal discs, capable of turning out 600 tons of cane per diem of 24 hours for *Bel-Air*, and for *Reliance* one battery with two cane cutters, to be ready for next season (June, 1889).

We hope next month to be in a position to give a detailed report of the work done at *Nonpareil*, as well as some valuable information as to what can be done by the most approved cane mills. There is much to be said on both sides.

The accounts from the Cane Sugar Countries are more favourable. In Cuba the present appearances point to a crop equal to that of last year (say 610,000 tons); at one time it was feared that the effects of the hurricane would be a lessened production by 15 per cent. In Java the prospects of the present crop are such as now to justify the opinion that it also will not be less than the previous one (say 380,000 tons).

In the House of Commons on the 26th ult., Sir James Fergusson stated, in reply to Mr. Picton, that the Sugar Convention had no binding effect whatever without ratification. Unless special circumstances intervened, contracting States ought to proceed to ratification, but there were many instances where treaties had been signed, but not ratified. In the present case legislation would be necessary in order to give effect to the Convention, and, therefore, when a measure was submitted to Parliament for that purpose, an opportunity would be afforded for discussion.

We learn that the handsome exhibit of Messrs. John Walker & Co., Sugar Refiners, Greenock, illustrative of the sugar industry at the Royal Exhibition of Glasgow, 1888, noticed in *The Sugar Cane* for July, page 370, has been presented to the City of Glasgow Exhibition in the Kelvington Museum.

The annual reports submitted to the meetings of various German Sugar Companies held during the past month, again show remarkable results, and in only one case (that of *Hünfeld*, capital M. 377,700) was there a loss, amounting to M. 40,773, nearly 10% of the capital. No explanation is given of this remarkable exception. The *Magdeburg Refinery*, however, presents a rather unsatisfactory report, prices since March this year having been so unremunerative that a large portion of the profit made in the earlier portion of the campaign was lost, and the dividend declared is only 6% on the preference, and 3% on the ordinary shares. The *Brunswick Sugar-Boiling Co.* also shows only an insignificant net profit of M. 208, this poor result being, as in the case of the Magdeburg Co., ascribed to the small margin between prices of raw and refined sugars. The following are the dividends declared by some of the manufacturing companies:—

Wendessen (capital, M. 367,500), 30%; *Pelplin* (capital, M. 600,000), 20%; *Cönnern* (capital, M. 180,000), 20%; *Ringelheim* (capital, M. 360,000), 15%; *Franstadt* (capital, M. 1,100,000), 14%; *Bauerwitz* (capital, M. 655,200), 10%; *Markranstädt* (capital, M. 450,000), 10%; *Bredow* (M. 1,200,000), 7%; *Altfelde* (M. 600,000), 5%; *Mannheim* (M. 428,500), 4⅔%; *Scheune* (M. 479,500), 5% on preference and 4% on ordinary shares, after clearing off a debit balance from last year of M. 94,607. *Langenwedding* shows a net profit of M. 86,843, on a share capital of M. 240,000; *Haynau*, a net profit of M. 83,483 on M. 800,000; *Gilbach*, M. 155,485 on M. 600,000, after paying off last year's loss of M. 10,381; *Warburg*, M. 88,389 on M. 1,063,500; *Obernjesa*, M. 21,512 on M. 750,000, after clearing off last year's loss of M. 27,895; *Harsum*, M. 17,372 on M. 675,000.

The *Neuwerk Co.* has made a net profit of M. 259,552 (capital, M. 1,500,000), which, however, only goes to reduce the unfavourable balance of former years, of which further M. 220,250 still remain to be cleared off; and the *Niederrhone Co.'s* net profit of M. 10,884 (capital, M. 461,000) in like manner goes to reduce the old debit balance, which still amounts to M. 73,518.

The *Trachenberger Zuckersiederei*, which last year showed a loss of M. 25,772 on its share capital of M. 600,000 and mortgage loan of M. 300,000, not only clears this off, but has made a further net profit of M. 215,000.

A new factory is intended to be erected at Nauen in the province of Brandenburg.

The *Pecek* (Bohemia) *Refinery*, which was transformed into a shareholding company, is being completely fitted up with the newest machinery, calculated to refine 100 tons of raw sugar daily.

The *Troppau* (Bohemia) *Refinery* pays a dividend of 7%.

The *Wawrowitz* (Bohemia) *Sugar Manufacturing Co.* declares 15% dividend.

In Belgium, the Factory and Refinery at *Hongaerde* (Brabant) has made a net profit of fr. 72,676 on its share capital of fr. 600,000. That of *Brugelette*, with a capital of fr. 484,000 has made fr. 66,626.

The following we take from the *Deutsche Zuckerindustrie* of 23rd November:—

"In view of the divergence of opinion of the two undersigned, as "regards the most important questions discussed in this Journal, "they have thought it desirable that the editorship should not be "continued on the former footing. Mr. Görz has consequently "retired from the editorship of *The Weekly Market Report* (*Wochen*-"*licher Marktbericht*). Berlin, 17th November, 1888.

"Joseph Görz. Wilh. Herbertz."

Mr. Robert Honing, Mr. Herbertz's colleague for many years, who has edited many numbers of the *Deutsche Zuckerindustrie* during his absence, undertakes the editorship of the *Wochenlicher Marktbericht.*

The same journal also states that in the international competition at Brussels, a diploma and silver medal has been granted to Mr. Joseph Görz, the editor of the *Telegraphische Correspondenz* (Berlin) in acknowledgement of his literary (statistical) labours in connection with the sugar trade. This is the only distinction that has been granted in this department.

At page 647 , we give the reports of experiments with sorghum, in the different States, which we take from Bulletin No. 18, of the United States Department of Agriculture, recently received. The latest intelligence, however, is from Dr. Peter Collier (the sorghum enthusiast), who is at work at Fort Scott, Kansas. The following is from *The American Grocer*:—

We have received from Dr. Peter Collier, Superintendent of the New York State Agricultural Experiment Station, a sample of sorghum sugar from a lot of seventy barrels the result of one day's run at Fort Scott, Kan. It is the colour of a light extra C of fine grain. Experts criticise the flavour severely. Used with tea it spoils the flavour. If this objection can be removed, then we shall have a formidable competitor with cane sugar. We believe, with Dr. Wiley, Chief Chemist of the Agricultural Department, that "if sorghum is to have a future it is to have a very big future."

Possibly the cause of the undesirable flavour may be due to the reasons given by C. A. Crampton, chemist, in a letter to the New Orleans *Item*, in which he refers to the average polarisation of the juice from the first chips as they enter the battery as being not less than 12 per cent. of sucrose, with a content of glucose but little above 1 per cent. He then says :—

Why, then, is it not true, as many a Kansas "boomer" has asserted, that the sorghum cane is a better sugar producing plant than its seedless

Louisiana cousin? The answer is found in the large content, in even the best and richest sorghum, of solids other than sucrose or glucose, for which we have no single collective name, but which the Germans call comprehensively, "not sugar." Here lies the root of the difficulty with sorghum as a sugar producing plant; these are the substances which lower its coefficient of purity and the practical difficulties of which are shown by the immense relative quantities of molasses from first sugars in the sorghum factories, which is full of sugar, but so loaded down besides by these gummy matters that the further extraction of sugar beyond the first crop of crystals is an unprofitable, unpromising, and glutinous task. The solution of this most salient problem in the path of development of the sorghum industry may be approached by at least four different lines of investigation, any one of which offers great prospect of success to the patient worker. First—a careful and complete study of the various substances: gums, carbohydrates, albuminoids, etc., of which these objectionable bodies consist, would be likely to throw some light upon the practical solution of the problem of their elimination, and has never yet been systematically carried out. Second—they may be avoided by reducing the quantity in the cane itself by proper methods of selection and cultivation; we have made a slight beginning in this line in the work at Sterling this fall. Third—their removal from the juice may be accomplished by improved methods of defecation and clarification. Fourth—they may be separated from the sugar in the molasses by some of the methods with which our beetroot confreres have been so successful of late years, or—if these cannot be adapted to our purposes—by other methods entirely. American ingenuity is not very prone to follow beaten paths.

By some or all of these various methods I doubt not that we will be able before long to greatly diminish this objectionable quality of sorghum, and when that day comes the Southern cane may well look to her laurels as a sugar producing plant.

We have before us the Louisiana sugar report, 1887-1888, edited by A. Bourchereau, New Orleans. Besides the usual sugar statistics, the present number contains what we take to be an entire list of the sugar plantations in Louisiana (about 1,250 in all), with the names of the proprietors, methods of manufacture, and the turn-out in sugar of each. It is a valuable annual, and for those who may be seeking information touching sugar in Louisiana more especially, it will be found very useful.

DEATH OF DR. WALLACE, OF GLASGOW.

We regret to have to announce the death of Dr. William Wallace, F.R.S.E., F.C.S., public analyst for the city of Glasgow, which took place on November 5. For two years Dr. Wallace had been in somewhat feeble health, and during the past month he was entirely confined to the house. While his death has thus not come unexpectedly to his more intimate friends, the sad intelligence will be received with surprise by many people, not only in the city, but throughout the country, by whom, both on professional and personal grounds, he was highly esteemed. Dr. Wallace, who had reached his 56th year, began his professional career in Glasgow as assistant to the late Dr. Penny at the Andersonian College. He held this appointment for a number of years. He was next appointed lecturer to the Mechanics' Institute (now the College of Science and Arts), and this position he also held for several years. In 1870 he entered into partnership with Mr. Tatlock and Dr. Clarke, and for many years a large and important business as analytical chemists was carried on by the firm. The office of public analyst for the city of Glasgow was conferred upon Dr. Wallace in 1874, and besides discharging the duties of this appointment to the satisfaction of the Town Council, he held a number of similar offices, in all of which, by his great skill as a chemist, and his courteous and agreeable manner with all with whom he came in contact, he extended his reputation and secured the esteem of a wide circle of friends. He was also gas analyst for the city, and in this connection it should be mentioned that he was the author of a work dealing with the analysis of nearly all the gas-yielding coals in Scotland. In conjunction with Dr. Russell, the medical officer of health for the city, he was the author of a series of papers published in 1879 dealing with the subjects of "The Prevention and Control of Infectious Diseases," and "Air, Water Supply, Sewage Disposal, and Food," the portion under the latter title being contributed by Dr. Wallace. He was also the author of a very large number of pamphlets, and of papers contributed to societies on a great variety of scientific subjects. Dr. Wallace was for many years an active and valuable member of the Glasgow Philosophical Society, of which some years ago he was elected to the position of president, an office which he filled with conspicuous ability.—Extracted from the *Glasgow Herald.*

DIFFUSION *versus* MACERATION AND SINGLE CRUSHING.

From the Demerara *Argosy*.

As our readers are sure to follow with interest any process calculated to ensure with increased certainty the victory of cane over beet sugar, we invite their attention to, and criticism of, the following figures, for the accuracy of which we can vouch. Taking first the

	Weight of Cane expressed as Juice.	Extraction of Sugar contained in the Cane.
Diffusion gives	85 per cent.	93 per cent.
Maceration	74 do.	88 do.
Single Crushing	67 do.	79 do.

But a comparison of these processes can only be made on a given weight of cane. Say 100 tons of cane of following composition:—

Saccharose	13 per cent.
Glucose	1 do.

100 *tons cane.*

Diffusion.

Extracts 93 per cent. of total sugar in cane = 12·09 tons saccharose in juice; 12·09 tons of saccharose at 80 per cent. recovery of dry sugar in manufacture = 9·672 tons *dry sugar recovered* = 19,344 lbs.

And 93 per cent. extraction of glucose in cane =	2·418 tons saccharose to molasses. 0·930 tons glucose to do.
½ total sugars for water and impurities (molasses contain ⅔ sweets) =	3·348 tons sweets to do. 1·674 tons water and impurities to do.
	5·022 *tons molasses* = 717 *gallons.*

Produce—19,344 lbs. sugar at 3½c. per 100 lbs.	$677 04
717 gallons molasses at 10c. per gallon	71 70
	748 74
Fuel—N.P. (26 cwts. coal per 2,240 lbs. sugar) = for 8·625 tons of 2,240 lbs. sugar = 11·22 tons (English) coal at $8	89 76
Nett proceeds	$658 98

Maceration.

Extracts 88 per cent. total sugar in cane = 11·44 tons saccharose in juice, 11·44 tons saccharose at 80 per cent. extraction of dry sugar in manufacture = 9·152 tons *dry sugar recovered* = 18,304 lbs.

And 88 per cent. extraction of glucose in cane = 2·288 tons saccharose to molasses.
0·880 tons glucose to do.

3·168 tons sweets to do.
½ of total sugars for water, &c. = 1·584 tons water and impurities to do.

4·752 *tons molasses* = 679 *gallons.*

Produce—18,304 lbs. sugar at 3½c.	$640 64
679 gallons molasses at 10c.	67 90
	708 54
Fuel at (4 cwts. per 2,000 lbs sugar) = for 9·152 tons sugar = 1·83 tons coal at $8	14 64
Nett proceeds	$693 90

Single Crushing.

Extracts 79 per cent. of total sugar in cane = 10·27 tons saccharose in juice; 10·27 tons saccharose at 80 per cent. recovery of dry sugar in manufacture = 8·216 tons *dry sugar recovered* = 16,432 lbs.

And 79 per cent. extraction of glucose in cane = 2·054 tons saccharose to molasses.
0·790 tons glucose to do.

2·844 tons sweets to do.
½ of total sugars for water, &c. = 1·422 tons water and impurities to do.

4·266 *tons molasses* = 609 *gallons.*

Produce—16,432lb. sugar, at 3½c.	$575 12
609 gallons molasses at 10c.	60 90
	$636 02
Fuel at (6 cwts. per 2,000lb. sugar) for 8·216 tons sugar = 2·46 tons (English) coal at $8	19 68
Net proceeds	$616 34

In single crushing labour and cost of plant will be less than in maceration or diffusion. In maceration and diffusion labour and cost of plant will be *about equal*, as a mill is required to crush the exhausted slices from the diffusion battery. If there is any difference at all, it will probably be in *favour of maceration.*

The extraction of sugar from cane, and the fuel required in the case of diffusion are from actual experience, and will probably be found to hold good in Demerara.

From the above data we are led to believe that good maceration nets more money per 100 tons of cane than diffusion.

In response to the invitations for criticisms upon the foregoing statements, the Editor of the *Argosy* has received the following :—

Dear Sir,—Allow me to make a few remarks, in response to the invitation to the criticism of figures contained under this heading in your issue of last week. Your contributor says that :—

	Weight of cane expressed as juice.	Extraction of sugar contained in the cane.
Diffusion gives	85 per cent.	93 per cent.
Maceration ,, ...	74 do.	88 do.
Single crushing	67 do.	79 do.

"Macerator," in the *Daily Chronicle* of the 8th, has very promptly pointed out the incorrectness of the 85 per cent. juice expressed to give 93 per cent. extraction of sugar by diffusion. He also correctly says :—"It is impossible to say exactly what expression of *original* juice 93 per cent. extraction of sugar by diffusion is equivalent to." So far, this is all right—but to return to the above figures. If 67 of the weight of the cane gives an extraction of 79 sugar, 74 ought to give, especially with maceration, more than 88. For instance : as 67 is to 79 so is 74 to 87·26, which proves that maceration in this case has done little or no work ! I agree with the statement that 67 single crushing will extract 79 sugar from the cane, but I have no hesitation in saying that with a double mill giving 74 expression, along with maceration, 93 to 95 of the sugar in the cane will be extracted. This work quite equals that of a diffusion battery, and until a very great reduction in the amount of coal can be arrived at, coupled with a guaranteed copious supply of fresh water—owners of powerful mills need have very little anxiety as to the diffusion process superseding them.

There is one other point, with reference to the working up of the juice into sugar. Eighty per cent. dry sugar can be got from mill juice, but one would have imagined that more than this amount ought to be obtained from the liquid coming from the diffusors. Purity of juice is or was one of the most important factors of advocates of the diffusion process ; theoretically this appears to be correct, as it is well known that the rate of diffusibility of albuminous compounds is very much slower than sugar ; the difference is about 7 for sugar compared with 50 for albumen. If 80 per cent. is a true figure I think it might be accounted for by the fact that a very large proportion of the natural juice of the cane bleeds out, so to speak, instead of being diffused, along with perhaps an increased inversion owing to prolonged evaporation of a weaker liquid. I am disappointed to learn that only 80 per cent. can be recovered in dry sugar from diffusion juice.

I am, Sir, etc.,

J. Owen Alexander.

Usine *Leonora*, West Coast, Demerara, 8th November, 1888.

DIFFUSION.

Sir,—It may interest your readers to have the actual mill and diffusion figures as obtaining here:—

	Mill. Run from 25th Oct. to 28th Jan., 1888.		Diffusion. from 26th Sept. to 28th Oct., 1888.	
Expression	70·4		81·36	
Sugar in cane	14·731=100		12·534=100	,,
Sugar in massecuite......	10·962= 74·414	,,	10·876= 86·77	,,
Sugar lost	3·769= 25·586	,,	1·658= 13·23	,,
Lost in megass and slices..	2·995= 20·331	,,	·945= 7·54	,,
Non-traceable loss	·774= 5·255	,,	·713= 5·68	,,
Sugar in after products and molasses..............	3·756= 25·497	,,	3·775= 30·12	,,
Sugar in 1st sugar	7·206= 48·917	,,	7·101= 56·65	,,

Sugar means chemically pure sugar.

It must be borne in mind that the above, as regards diffusion, includes every loss inevitable to the starting of a new process, and on one occasion the loss of a whole day's syrup when the subsider loft fell down.

Our mill crushing is taken at 70·4 per cent. from laboratory analyses of the megass, and it is but fair to say that when 108 tons of cane were actually weighed we only got 68 per cent. I doubt myself whether there is any mill process in the colony which averages 70 per cent. crushing.

Our books are at the disposal of visitors; the process is simple; cheap as regards labour; and though we are using more coal to the ton of sugar, we prefer buying coal to burning sugar as we find it more economical.

At the commencement we burn 26 cwt., but it has come steadily down, and we expect to get it to 17 cwt., thanks to the Rillieux.

A careful comparison of the foregoing figures shows that *our* mill work even without coal is a considerable loss as against diffusion.

The work since 20th October has given even better results than what I have shown here.—I remain, etc.

H. G.

Plantation *Nonpareil*, November 6th, 1888.

BARON DE WORMS, M.P., AT GREENOCK.

ENTHUSIASTIC RECEPTION.

There was a great demonstration in Greenock on November 1st in honour of Baron Henry de Worms, M.P., Under-Secretary of State for the Colonies. At 5-30 the Baron was entertained by the inhabitants to a complimentary banquet in the Saloon of the Town Hall. All the leading residents in the district were present as well as many of the merchants of Glasgow, the occasion being in recognition of Baron de Worms's services as British Plenipotentiary to the Sugar Bounties Conference. The Greenock people showed their gratification at the prospect of the abolition of the bounties through the efforts of Baron de Worms, not only by the banquet in his honour, but by presentations at a public meeting afterwards of illuminated addresses from the Corporation and sugar refiners and from the working men. The address was enclosed in a magnificent casket bearing his arms and monogram, and representations of a sugar refinery, the local public buildings, and of the James Watt's Statue in Greenock. The address given by the working men was enclosed in an exquisitely designed cylinder supported by representations of a thistle, and it bore the Baron's arms and monogram, with a tablet recording the gratitude of the working class. The Provost presided at the meeting, which was large and enthusiastic. In acknowledging the presentations,

Baron de Worms, who was received with cheers, acknowledged the honour conferred upon him by the presentation of addresses from the Corporation of Greenock and the working men of the town, and claimed that bounties belonged essentially to the class of non-party questions. Proceeding at once to reply to the criticisms of Sir Thomas Farrer upon the Sugar Bounties Convention, Baron de Worms said:—The following figures will show the sacrifices foreign countries make in order to maintain the bounty system. Bounties cost France £3,380,000; Germany, £3,238,484; Austria, £1,036,667; Belgium, £813,000; Holland, £309,655. In Germany this amounts to £5 per ton on the quantity exported, in France to £8 per ton on the quantity manufactured, in Austria to £3 per ton on the quantity exported, in Belgium to £8 per ton on the quantity exported, and in Holland to £3 per ton on the quantity exported.* Why do foreign Governments make these tremendous sacrifices? The answer is very simple. Their object has been and is to develop by artificial means their own sugar industry, and the artificial means they adopt are the State subsidies. Against whom is this artificial competition aimed? Against the cane sugar producer of the British colonies and the refiner of the British towns. It is impossible to suggest any other reason for the existence of sugar bounties in foreign countries, inasmuch as the great sugar market of the world is England, and that the only means by which foreign countries could hope to compete with or to destroy the British sugar industry was by giving an advance to their producers and refiners—a profit far away greater than the legitimate profit which could be earned in the ordinary course of trade. But Sir Thomas Farrer tells us that bounties are mainly bad for the countries giving them.

Let me test that assertion by facts and figures. The cane sugar imports between 1852 and 1861 averaged 94 per cent, while in the same period before bounties were given the beet sugar imports were only 6 per cent. In 1878 the cane sugar imports were 63 per cent. In the same year, bounties having been given since 1862, the beet sugar imports had increased to 37 per cent. In 1880 the cane sugar imports fell to 60 per cent., while the beet sugar imports advanced to 40 per cent. In 1884 the cane sugar imports receded to 49 per cent., and the beet sugar imports rose to 51 per cent. In 1886 cane sugar imports declined to 42 per cent., and beet sugar imports increased to 58 per cent. So that to sum up, while formerly we received but 6 per cent. of beetroot sugar, since that article has had the advantage of bounties the imports of it into the United Kingdom have advanced to 58 per cent., while cane sugar imports (mainly from the British colonies) have declined for the same reason from 94 per cent. to 42 per cent. These figures and facts relate only to our British trade; but let us consider the effect of bounties upon our colonies. It is estimated by Mr. Lubbock that the total value of the West Indian estates is £12,700,000, those of Mauritius £6,000,000, and those of India £1,000,000. The number of people employed in the sugar industry is 250,000 and the annual amount of wages paid to them is £6,000,000. Therefore, the general effect of bounties upon our home and colonial trade may be summed up in the following figures, which have been accepted as reliable. Mr. T. E. Tinne, chairman of the West India Association of Liverpool, in evidence before the Royal Commission on the Depression of Trade and Industry, estimated the loss to Great Britain and the colonies through bounties as follows :—The increased colonist output of 250,000 tons of sugar would have been a gain to the labourers of £1,500,000; to proprietors, interest on increased capital, £500,000; saving in rice freights, £45,000; increased employment to coolie vessels, £75,000; increased sugar freight, £550,000; engineers' profits on increased machinery, £50,000; wages to mechanics in England on ditto, £300,000; freight on increased machinery, £20,000; wages on extra coal raising, £48,000; wages on increased manufactured goods exported from England to West Indies, £2,000,000; increased net proceeds on colonial sugar, £500,000. Divided between the colonies and this country these figures together represented a loss to colonial labour of £1,500,000, to proprietors of £1,000,000, and to England of £3,088,000. Taking a working man as representing £50 per annum, this sum of £3,000,000 would represent 60,000 working men displaced. Mr. Shipton, the secretary of the London Trades' Council, last year declared that in nine firms alone they were employing fewer engineers by nearly 6,000 than they were employing 'four years ago, owing to the foreign State bounties. The same gentleman estimates that altogether 50,000 persons are deprived of labour through bounties. Seven trades are affected—engineers, carpenters and joiners, steam engine makers, ironfounders, boiler makers, and blacksmiths.

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* We presume Baron de Worms includes, in this estimate of the loss to the different countries by the bounty system, the higher price which the home consumer has, in consequence, to pay for his sugar. The bounty, that is, the difference between the amount of drawback given on exportation and the actual duty paid, is nothing like these figures.—Ed. *S. C.*

The loss to our shipping by reason of the depressed condition of the colonial sugar industry is put down at £1 per ton, and a like loss may be attributed to the non-requirement of machinery to sustain and develop the colonial sugar industry. For example, a firm at Derby, formerly employing 600 or 700 men on machinery for the West Indies has, owing to bounty competition, been obliged to reduce the number fully 100 per cent. There is also a loss to our home coal producers, owing to foreign fuel being consumed in the production of sugar, the average amount spent in the West Indies on coal being not less than 10s. per ton of sugar. Is there any further justification wanted than that given by these figures for the action of her Majesty's Government in convening the Conference and signing the Convention. Have we not before us the most striking evidence why foreign countries granted bounties, even though those bounties entailed great financial sacrifices upon their exchequers? They wanted to defy our competition. They wanted to stop our colonial production. They wanted to close our refineries, and I have shown by facts and figures how far they have succeeded in their attempt.

Sir Thomas Farrer cavils at what he calls the undignified spectacle of a British Minister going cap in hand to foreign Powers. What, I ask, was undignified in the course we took? We had nothing to offer to foreign Powers in exchange for that which, rightly or wrongly, they deemed to be a concession. We could only represent to them in a spirit of fairness and justice—a spirit in which I must say I was always met during the course of my negotiations on the Continent—that the system of bounties was contrary to the best principles of Free Trade, and to the sentiment of equity and justice which should govern the commercial relations of the world. Certainly the result of my negotiations abroad has been satisfactory, and I venture to hope and believe that long before the execution of the treaty France will have given her adhesion to it. Sir Thomas Farrer says Austria and Belgium have not adhered to the Convention. That is absolutely incorrect, and the statement is the more remarkable because Sir Thomas Farrer must have seen that the plenipotentiaries on behalf of these Powers have affixed their signatures to the Convention. The reserves to which he chooses to attach such exaggerated importance are merely to the effect that if three years hence, when the treaty comes into force, any of the European bounty-giving Powers should not have come into the Convention, Austria and Belgium claim the right of reconsidering their position. Baron de Worms next replied to the argument of Sir Thomas Farrer, that England had, under the fourth clause of the Convention, abandoned her right to impose, should it be necessary, an excise duty upon either her home or colonial sugars, and by examining the words of the clause, the speaker contended that there was no foundation for such an argument. He explained the concession which her Majesty's Government had made on this question, and denied that the seventh clause of the Convention was in violation of Free Trade principles. He said: It is in no sense of the word Protection.

It is interesting to note that with regard to the penal clause the last paragraph of it, which prevents nations that have the most-favoured-nation clause in their treaties of commerce pleading that clause as against the application of this clause, was actually proposed by France, and unanimously adopted by the Conference. Again, the enforcement of this penal clause is hedged in with extraordinary provisions, to prevent its being arbitrarily and unjustly put in force. The penalisation of any single Power infringing the Convention cannot be the act of any individual Power. This is an argument of supreme importance in answer to those who would have it believed that England has adopted a protective and retaliatory policy. Now, I have to ask you how our remedy will operate? The greater number of sugar-producing Powers sending their sugar to our markets are parties to the Convention, those who have not yet signed sending us comparatively but a small proportion of the sugar we use. If, therefore, when the treaty comes into force, those Powers still remain aloof, the amount of sugar which would be prohibited would be comparatively small, as these figures will show:—In the nine months of the present year only 2,000 tons, or but 1 per cent. of our total imports of refined sugar, have come from the United States, as compared with 20 per cent. in 1886. This is owing to the reduction in the drawback in the United States. Now, setting off Brazil and Egypt against France and Denmark, the imports in 1887 into the United Kingdom, from countries outside the Convention, were less than 4 per cent. of the raw sugar. The refined sugar imports in 1887 were 33 per cent. from "outside" countries; but deducting the United States, from which, as I have already shown, sugar has ceased to come in any large quantity, the outside sugar supplied is reduced to 20 per cent. for refined sugar. Taking raw and refined together, only 12 per cent. of our imports last year were from outside countries. This would be reduced to 10 per cent. by eliminating the United States imports. This year's trade returns for the nine months ending September show that only 7 per cent. of the whole imports of raw and refined sugar have come from countries outside the Convention.

Sir Thomas Farrer argues that if the bounty system is abolished sugar will necessarily become dearer in this market. The answer is that, by the abolition of the bounties, fair competition once again obtains its full power in our own colonies, who now send much of their sugar to America. Our manufacturers and refiners will again produce and help to swell the amount and make the supply meet the demand, thereby rendering any material rise in price impossible. If Sir Thomas Farrer's argument is worth anything, you are face to face with this position—that it is better to allow the industry to die out and thousands of our working men, representing all trades, to starve, than to run the possibility of a rise—a temporary fractional rise—in the price of sugar, which might in the artisan's family entail the loss of a few shillings a year. I have shown you by the indisputable testimony of figures how wide-spread are the ramifications of the evil caused by the bounty system, and how seriously it affects British and Colonial interests; but over and above the damage caused by the existence of the sugar bounties we are bound to consider whether or not this pernicious system may spread to other industries, and whether, if such possibility exist, the action of Her Majesty's Government in bringing about the Convention has not been most timely and useful. As a matter of fact, the bounty system does exist in connection with other trades, a fact of which you in Greenock are painfully aware. In France bounties are given on the construction of vessels, varying from 10f. to 60f. per ton gross. In Italy similar shipping bounties are given, varying from 15f. to 60f. Boiler and machine allowances are also given. France grants at present one franc and 15 centimes per ton in respect of iron vessels per 1,000 miles, and wooden vessels one franc per ton per 1000 miles. Italy grants bounties on navigation at the rate of 65 centimes per net ton per 1000 miles. If, then, we are to accept blindly the teachings of prejudiced theorists like Sir Thomas Farrer, and to say that we are calmly to see our commerce dwindle before our eyes and transferred to foreign markets without an attempt to save it; and if we are further told that Free-trade demands such sacrifices, then I say that the teachings of John Stuart Mill and Cobden are either misunderstood or misinterpreted by those who put so forcible a construction upon them.

Free trade means the free and fair interchange of commodities unfettered by over-weighting fiscal burdens; it means that which Great Britain to her benefit has honestly carried out for many years, namely, the opening of her ports to the merchandise of the world—strong in the conviction that the industry of her sons and the intelligence of the nation would successfully bear the brunt of free and unfettered competition. Facts have shown that she had no reason to fear that competition so long as it was fair and legitimate. The facts which I have brought before you to-night prove that no country, however intelligent and however industrious, can hold it own against unfair competition. Bounties are unfair competition. They have been condemned by the apostles of Free trade. They are a violation of its true principles, and I maintain that it is the duty of every Government, as it has fallen to the lot of this one, to take effective, stringent, aye, and immediate measures to prevent any of our industries suffering damage from such unfair means. This is not protection in the invidious sense in which that word is applied. This is self-defence. This is not the upholding of any fantastic theory termed "Fair trade," but it is the action of a Government backed up by those who wish the industry of their country to flourish, and to put down once and for ever unfair trade. I have said that the bounty system was dangerous, as it might, creeping upwards and extending its branches like an insidious parasite encircling the noble oak, sap the life-blood of our British commerce. To-day the bounties on sugar and on shipping destroy one industry and do much to cripple another; to-morrow may bring bounties on iron, coal, and cotton manufactures. Where then, would be our home industries? It is to check an existing evil and to prevent the possibility of further disaster that this Convention has been signed, and will so far as Her Majesty's Government is concerned be carried out in its integrity.

The following letter and enclosure have been received by the West India Committee:—

"Colonial Secretary's Office, Jamaica,
October 9, 1888.

"Sir,—I have the honour to forward by the Governor's direction for the information of the West India Committee, the enclosed copy of a resolution passed by the Legislative Council of this island on the 5th instant expressing their appreciation of the great service rendered to this colony by the efforts of Her Majesty's Government, of Baron Henry de Worms, and of the West India Committee to procure the abolition of the Sugar Bounties.

"I have, &c.,
"J. Allwood, Assistant Colonial Secretary.

"J. L. Ohlson, Esq., secretary to the West India Committee."

"At a meeting of the Legislative Council of Jamaica, held at Headquarter-house, on Friday, October 5, 1888, "Mr. Solomon moved the resolutions of which he had given notice, with verbal amendments, as follows:—

"Resolved, that the thanks of the Legislature of Jamaica be tendered to Her Majesty's Government for their efforts to abolish the system of bounties on the exportation of sugar from foreign countries.

"That the special thanks of this Council be offered to Baron Henry de Worms for the valuable services he has so ungrudgingly given to the West Indian Colonies in his endeavours to effect the abolition of sugar bounties, and this Council desires to place on record its high appreciation of the untiring energy, tact, and great ability he displayed throughout the prolonged negotiations with foreign countries.

"That this Council offers grateful thanks to the West India Committee for their efforts to bring about the abolition of bounties, a result which this Council hopes may be of lasting benefit to this and other West Indian colonies.

"That his Excellency the Governor be solicited to forward copies of these resolutions.

"Motion seconded by Mr. Espeut.

"Resolution agreed to."

SIR THOMAS H. FARRER'S REPLY TO BARON H. DE WORMS, M.P.

The following is a copy of a letter from Sir T. H. Farrer, addressed to *The Times*, in answer to Baron de Worms's speech at Greenock:—

Sir,—I have before me Baron de Worms's Greenock speech as reported in your number of November 2, but being away from home, I have no other papers to refer to. From the inaccuracies in the references which the Baron is reported to have made to my letters I might, perhaps, infer that the report itself is imperfect, but as the reported speech is before the public it is well at once to give it, as it stands, such an answer as under the circumstances it is in my power to give.

The speech is, perhaps, less remarkable for what it says than for what it omits to say. Being professedly an answer to the objections to the convention made in my former letters, it contains no attempt to answer most of them. I said, for instance, that the area of sugar-consuming countries outside the convention is sufficient to prevent any effectual boycott; that the convention commits us to a breach of our commercial treaties with some of our best customers; that, without any *quid pro quo*, it prevents us from giving to our colonies the protection which the other countries parties to the convention are now giving and will continue to give to their colonies; that it interferes with the fiscal liberty of our self-governing colonies by forbidding them to impose differential duties on beet sugar, as Victoria and the Cape are now doing or proposing to do; that the convention sets up an inquisition into the making and refining of sugar in every sugar-producing country; that this inquisition will have most delicate and difficult questions to settle; that it will consist not only of interested parties but of parties whose interest does not coincide with our own: that we shall be bound to manage our own commercial policy according to its decision; that the convention will reintroduce into our Customs system the difficulties of certificates of origin with all the mischievous and futile apparatus by which in former days we tried, often in vain, to receive or refuse goods according to their country of origin; that it will require our Customs, for instance, in the case of imported sugar to try to distinguish sugar made in Germany from sugar which has been made in France or America; and, finally, that we shall by this convention be setting a precedent which will not only call for similar retaliation in the case of many other bounty-fed articles, but which will naturally lead to retaliation upon other foreign articles, including foreign corn.

No one of these objections does the Greenock speech answer, and any one of them is enough to destroy the convention. To my own mind they are even more decisive than arguments founded on the price of sugar, because, as at present advised, I doubt whether bounties have had the effect attributed to them, whether they constitute the chief causes of the recent cheapness of sugar, and whether West Indian sugar-planting or British refining would regain their place in our markets if bounties were abolished.

However this may be, whether the convention makes sugar dearer and thereby improves the condition of our sugar producers, or whether it has no such effect, the objections above stated are equally valid, and it may very well happen that in adopting this convention we shall be subjecting ourselves to all the inconveniences involved in them, without attaining the one object which the authors of the convention have in view—namely, the protection and development of our own sugar industries.

There are, however, two arguments of mine relating to the effect of the convention on our supply of sugar to which Baron de Worms does reply, and to these replies I wish to offer rejoinders, premising that, in the absence of other sources of information, I accept the Baron's figures for the purpose of argument and for that purpose only.

In the first place, I had said that by boycotting countries not parties to the convention we might materially reduce the market from which we draw our supplies, and that thus sugar might be made scarcer and dearer to us. To this Baron de Worms replies that these countries send us comparatively little sugar, and he gives figures for 1887 and 1888 showing, as I understand them, that only 10 or 12 per cent. of all our sugar, raw and refined, is now coming to us from countries outside the convention. Whether he includes Brazil in the outside countries, and if not why not, and whether he treats Brazil, which gives, or lately did give, a guarantee to capital employed in sugar making, as a country to be boycotted, and if not why not, remains to be seen. But putting aside details and accepting the Baron's figures, my first rejoinder is that nothing can be more fallacious than to take the returns of one year or of two years as evidence of what the markets for sugar may be hereafter. The sugar industry is constantly changing and developing, and countries which send us little to-day may send us a great deal two or three years hence. The United States sent us a great deal a year or two since; no doubt, as Baron de Worms will say, in consequence of their then existing bounties on refined sugar; but the United States are at this moment developing a large sugar growing industry in the west; they still, according to the Baron, give a small bounty on exportation, and there is no knowing what that great country, unless prevented by our own action, might not send us in a few years. If we cut off half the producing world from our market we do not know how much sugar we may be excluding.

My second rejoinder is that when we have abolished the bounties which the parties to the convention now give we shall have entirely changed the present situation. According to Baron de Worms and his supporters it is by means of the advantages, arising from bounties, that the sugar makers of Germany, Austria, Holland, and Belgium, have obtained possession of our markets to the exclusion, more or less, of the other countries. It follows that, when their sugar makers no longer possess these advantages, other countries, including those outside the convention, would recover their position and would, if not boycotted by us, send us much more sugar than they now send. The bounties given by Germany have, it is said, enabled her sugar makers to oust the French and other sugars from our markets; if so, the immediate result of abolishing the German bounties would be to give us much more French sugar, more United States sugar, more Brazil sugar, and so on; and, if we are to boycott these latter sugars, we shall be excluding countries which, upon the abolition of the German, Austrian, and Dutch bounties, would probably be our chief sources of supply.

For these reasons it is clear that the 10 or 12 per cent. which countries outside the convention now send us is no measure whatever of the proportion which we should exclude by boycotting them in terms of the convention. What we should exclude is an unknown, and probably a very large, proportion.

The second argument of mine which Baron de Worms tries to answer was that, if the case made by the anti-bounty agitators is well-founded, if it is true that bounties have, by making sugar cheap, injured our West Indian producers and our refiners, then it is only by making sugar dearer that the abolition of bounties can do them good. To this Baron de Worms replies that the abolition of bounties will not make sugar dearer; that our own producers will come in and make it cheap; and that German and Austrian sugar-makers will, when deprived of the factitious aid afforded by bounties, redouble their efforts and keep us supplied as cheaply as before. On such a view of the facts as I have been able to obtain, I have not hitherto been prepared to deny that this might possibly turn out to be the case. But, then, what becomes of the argument that it is the bounties which have made sugar cheap, and have thus, as is alleged, ruined our own sugar-producers? I confess, however, that the Baron's figures, if they can be relied on, stagger me, and make me think that the abolition of bounties must cause a large rise in the price of sugar.

He tells us, on the authority of some representation of our sugar-producers, that the annual loss to them caused by the bounties amounts to £4,000,000; equivalent, as he says, to the loss of employment of 60,000 men. Such figures and the inference from them must be equally apocryhal. Without criticising or replying to such a statement, I pass on to the more important figures in which Baron de Worms states the amount of bounties now given by France, Germany, Austria, Belgium, and Holland. How he gets them he does not tell us; but he puts them at the enormous sum of very nearly £9,000,000 a year. He says, further, that England is the great, if not the only, market for all the sugar fed by this gigantic subsidy. Under these circumstances I should like to know how it is possible to withdraw from the sugar-producers who are now the principal feeders of our market a subsdiy of £9,000,000 a year, and at the same time expect either them or those with whom they are now successfully competing to supply us with the same quantity of sugar with which we are now supplied and at the same price?

My own opinion has hitherto been that the effect of the bounties is much exaggerated, and that neither their continnance nor their abolition would, in the face of more important factors, have the effect attributed to them by the anti-bounty agitators. But if the bounties are as great as they are now stated to be, and if they have the effect attributed to them by Baron de Worms and his friends, their abolition must have a very great effect in making sugar scarce and dear.

One word to those who sincerely desire to see bounties abolished. Baron de Worms calls attention to the fact that the United States, a year or two since, gave large bounties, but have been wise enough to reduce them, without treaty and without bargain, not for our sakes but for their own. Does not this point to the most hopeful as well as the least objectionable way of getting rid of bounties? Germany and Austria, it seems, now take a similar view of their own interests, and would probably before now have reduced or abolished their bounties if it had not been for the rivalry of France. France too, a short time since, was by way of reducing her bounties for her own sake; and seems to have increased them in opposition to Germany. Thus political feeling has entered into an economical question, and this feeling has obviously been much aggravated by the present negotiations. The French Government are less disposed than they were to abolish bounties, and the French upholders of the bounty system have it now in their power to quote the authority of England, the great foreign market for sugar, for the proposition that bounties are such an injury, not to the country which gives them but to to the country which receives the produce of the bounties, as to render it worth while for the latter country to make great sacrifices in order to get rid of them. Might it not have been better, in the mere interest of those who wish to see bounties abolished, to stand aloof and leave France and Germany to come to their own senses?

I desire to add one word of sincere apology to Baron de Worms for attributing to him in my first letter* electioneering motives. I had no right to say it and I doubt if it is true. A belief in protection, sincere and deep, if unadmitted and even if unconscious, is sufficient to account for the action of those whe have negotiated this convention on the part of England.

T. H. Farrer.

Naples, *Nov. 6th.*

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* See October *Sugar Cane*, pages 523-527.

SORGHUM SUGAR INDUSTRY IN THE UNITED STATES.

Manufacturing Trials to produce sugar from sorghum at Crystal Lake, near Chicago; Faritault, Minnesota; Campaign, Illinois; Hutchinson, Kansas; Sterling, Kansas; Franklin, Tennessee; Ottawa, Kansas; and Rio Grande, New Jersey.

The following particulars of the experiments made at the above-named places, are taken from Bulletin No. 18, just issued, of the United States Department of Agriculture (Division of Chemistry):—

Manufacturing Trials without the Department.

I could not give here all the incidental attempts at making sugar which have been made in connection with the manufacture of molasses from the time of the introduction of the sorghum plant into this country to the present time. I will confine myself to a brief review of the attempts which have been made to produce sugar.

Crystal Lake near Chicago.

I believe the first attempt to make sugar from sorghum on a large scale in this country was at Crystal Lake, near Chicago. The factory was under the direction of Mr. J. B. Thoms. According to the report of the National Academy of Sciences on Sorghum—*

In 1879, with a "miserable mill," he obtained juice of 8½° B. (specific gravity 1,060), and from a gallon of syrup weighing 11 lbs. got a yield of about 4½ pounds to the gallon. He obtained from 15 to 23 gallons of syrup to the ton of cane, weighing 11½ pounds to the gallon, the syrup yielding 4½ pounds sugar, polarized 53°. Of amber cane, which is the only sort he has worked, has known as high as 21 tons cut to an acre, and states 12 tons as an average. He sold of the crop of 1879 over 50,000 lbs. of good C sugar, which was tested in Boston and New York, and polarized 96½ per cent. of sugar. In 1880 his crop of about 300 acres was nearly all destroyed by a hurricane, and the product of about 30 acres of damaged cane was all made into syrup, which polarized only 42 per cent.

Further data concerning operations at Crystal Lake and Hoopeston I give in quotations from the communication of Mr. Thoms to the committee of the National Academy.†

In the first place let me state to you I am a practical sugar refiner; spen some eight years in the West Indies making sugar from cane. So you will perceive I came here well armed in the knowledge of the business of sugar making. In August, 1879, I saw sorghum for the first time, and although the works were put up by inexperienced persons, besides being so near the time for grinding the cane, we had not much chance to make the necessary alterations, so had to get along as well as we could; and as the cane was new to me, and I had little or no faith in its sugar-producing qualities, I resolved te treat it with as much delicacy as a mother would her sick child.

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* Report Nat. Acad. of Sciences, p. 36. † *Op. cit.*, pp. 119, 120.

In consequence of the vacuum-pan boiling the sugar so hot, and not being familiar with the juice, and wishing to get as large a yield of sugar as possible, I boiled it rather stiff, which made the grain finer than I wished it, but to the experienced that did not detract one iota from its strength. I continued to run until I had made over 50,000 pounds of sugar.

In 1880 we had made alterations in order to do some pretty good work; planted about 300 acres of cane, and a month before it matured it was struck by a hurricane and damaged to such an extent that we received only the product of 30 acres; that, mixed with dead cane, rendering the juice so bad that the syrup only polarized about 42 per cent. Boiled some for sugar, but finding it very gummy abandoned the idea and made only syrup. Thus ends the chapter for 1880. In 1881 the spring was so backward our cane hardly matured, and the syrup from it polarized about the same as the previous year (42½ per cent.). Having such bad luck the past two years at Crystal Lake, Ill., where the above experiments were tried at the works of F. A. Waidner & Co., we have concluded to abandon any further work at the above place. I should here state that Crystal Lake is the most elevated section in the State of Illinois, which makes raising a crop there rather uncertain; although the old residents of the place say they never experienced two such years with sorghum as 1880 and 1881; indeed, that is the general verdict throughout the country. Crystal Lake is situated about 44 miles north of Chicago. I am interested in a large works at Hoopeston, Ill., which is attached to a corn-canning establishment erected for the purpose of utilizing corn-stalks. That we found was no go, as the stalks had but little juice; could not produce enough syrup to pay expenses. I consider the corn-stalks had a thorough test. We found only about a foot or a foot and a half of the stalk to contain juice; the rest was a dry pith. At the time the corn was in the roasting-ear. The corn-stalks were tested in 1880. In 1881 we cultivated 500 acres of sorgo, and the drought was so severe we only got about 2¾ tons to the acre, instead of from 10 to 20. Cane was very thin, and in some instances not over 2 or 3 feet long, syrup only polarizing 40; did not attempt to make sugar. This year we are putting under cultivation at Hoopeston 1,000 acres. We sold all of our product last year by the car-load in this city at 50 cents per gallon.

Notwithstanding I have been here three seasons I have not had a single day's fair trial of sorgo juice. With the plant of machinery we have at

Hoopeston now to work up juice such as I had in 1879, I am sure the results I could produce would astonish the country.

I am satisfied of one thing, that the cultivation of the cane is not thoroughly understood. One great drawback here has been the want of proper machinery and a knowledge how to treat the juice. They imagine all that is necessary is to boil out the water and let nature do the rest.

I have been a very careful student for the last three years, and consider myself now familiar with the juice, and just want one fair chance. They were thirteen years in Louisiana before they could successfully make sugar from ribbon cane. We did it here in six weeks.

I will add that the further attempts to make sugar at Hoopeston were total failures, and both factories have been abandoned and dismantled.

Faribault, Minn.

In 1879 a factory was built at Faribault, but no sugar was made.* In 1880 5,000lbs. sugar were made.† In 1881 there are several conflicting reports of the amounts made. Blakeley reports 7,000lbs.‡ He also reports the amount at 11,000lbs.§ The total amount made during the season is also given at 15,000lbs.‖

The manufacture of sugar having proved financially unsuccessful further operations were abandoned and the factory closed.

Champaign, Ill.

A large factory was built at Champaign, Ill., in 1882. This factory was under the immediate supervision of Professors Weber and Scovell. Professor Weber says:¶.

As a result of the experiments carried on by the writers in the seasons of 1880 and 1881 the Champaign Sugar and Glucose Company, of Champaign, Ill., was organized. The object of the company was to carry out on a commercial scale the production of sugar and glucose from sorghum, as was indicated by our laboratory experiments. The company was organized with a capital stock of $25,000. The total expenditure for building the works and raising the crop, however, exceeds $30,000.

The committee of the National Academy ** say:

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* Blakeley, Report Nat. Acad. Sciences on Sorghum, p. 35.

† *Op. cit.*, p. 35.

‡ *Op. cit.*, p. 36.

§ Third Ann. Meeting Wis. State Cane-Growers' Association, p. 33.

‖ Report Nat. Acad. of Sciences on Sorghum, p. 30.

¶ *Op. cit.*, p. 78.

** *Op. cit.*, p. 34.

In 1882 the results of the sugar mill at Champaign, Ill., are reported as being very satisfactory to owners.

Several hundred thousand lbs. of white sugar were made in that and the two following seasons. The venture, not proving profitable, was abandoned.

HUTCHINSON, KANS.

This factory was built in 1882, but the first year failed to produce any sugar. In 1883 about 200,000lbs. of sugar were made, but at a heavy loss.

In 1884, 250,000lbs. of sugar were made, but still with a loss. Further attempts were then abandoned and the factory has been dismantled.

STERLING, KANS.

The first season's work of this mill, 1882, resulted in the production of a very small quantity of sugar. In 1883, 170,000lbs. were made. In 1884 a little over 100,000 lbs. sugar were manufactured and the business was then abandoned as unprofitable.

FRANKLIN, TENN.

The disasters which attended the fortunes of this company, 1883-1884, were not softened by the production of sugar. The young sugar-boiler at first secured a few crystals in his pan. Each day, however, the results were poorer, "and at the end of one week no trace of sugar could be found, and in mortification he left without notice and has not yet been heard from." *

OTTAWA, KANS.

A large glucose factory here was converted into a sorghum-sugar factory. Sugar was made in considerable quantities in 1884 and 1885, and the house was then shut up, the business being attended with financial loss.

RIO GRANDE, N. J.

This factory is the most extensive and thoroughly equipped of any sorghum-sugar house ever built in the United States.

For five successive seasons from 1882 it was conducted with the highest skill. With the aid of a State bounty of $1 per ton for the cane and 1 cent a lb. for the sugar. the company was able to hold together financially. With the close of 1886 the State bounty expired and the factory has now been closed and dismantled, since it could only be run at a loss without the bounty. In all nearly 1,500,000 lbs. (670 tons) of sugar have been made by this company.

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* Department of Agriculture, Div. of Chemistry, Bull. No. 5, p. 165.

In speaking of the operations of the large factories the committee of the National Academy says:*

> One signal success, on a large scale, obtained by intelligent attention to the results of experimental research and skilful culture, opens the way to a repetition of like results.
>
> It is from the States of New Jersey and Illinois that we are able to cite examples of success on so large a scale and attended with such a satisfactory result as fairly puts to rest any doubts as to the production of sugar, on a great scale, in a northern climate with a commercial profit.

How sadly the members of the committee suffered themselves to be deceived, the financial ruin of the above two "successes" has attested.

At the present time, May, 1888, there remains only one sorghum sugar factory on a large scale in the country, viz., at Fort Scott, Kans. One is building at Topeka and one at Conway Springs, Kans. Col. Cunningham, Sugar Lands, Tex., is also preparing to make sorghum sugar in connection with the sugar-cane.

The following experiments at Campaign, Ill.; San Francisco, Cal.; Geneva, Ohio; Warrensburgh, Missouri; Pon du Lac, Wisconsin; Vernon County, Wisconsin; Jefferson, Ohio; Edwardsville, Illinois; Cedar Falls, Iowa; for which an award of $1,200 was made by the Commissioner of Agriculture, we also take from the same source:—

(1) CHAMPAIGN, ILL.

The Champaign Sugar and Glucose Manufacturing Company in 1882 submitted a report of its operations to the Commissioner of Agriculture, of which the following is a summary:†

Number tons cane worked for sugar	1,723·99
Number acres cane	185·8
Pounds sugar manufactured	86,603·00
Pounds sugar per ton	50·3
Pounds sugar per acre	465·5

A part of the crop was so poor in sucrose that it was worked for molasses only. The climatic conditions attending the experiments are described as follows:‡

> The weather during this year, so far as planting, cultivating, maturing the crop, and the development of cane sugar in sorghum in this section of the

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[*] Report National Academy of Sciences on Sorghum, pp. 30, 31.

[†] Encouragement to sorghum, etc., 1883, p. 13.

[‡] *Op. cit.*, p. 11.

country has been the most unfavourable of any year within our knowledge, and we are informed by those who have grown sorghum and broom-corn that this year has been the most unfavourable season for upwards of twenty years in this section for those crops.

Further difficulties in manufacture are also described:[*]

The company were unfortunate in not having a crystallizing-room, capable of being heated to the proper temperature for the best results in crystallization and the subsequent purging of the sugar. The room was so cold that the melada was too stiff to arrange itself evenly in the centrifugal without the addition of warm water in the mixer, and even then it was often found impossible to purge without washing with warm water. We took the trouble to make experiments to see how much or what proportion of sugar was being washed down with and into the molasses by reason of the cold. It was done by taking a certain weight of melada, 120 lbs., which was carefully warmed and then swung out. The yield was 56 lbs. of dry sugar. The same amount of melada from the same car was swung in the usual way, and the yield was 32 lbs. of dry sugar, or a loss of 18 lbs. of sugar in a purge, by reason of the cold. We had but a few days of favourable weather, and the results from it compared favourably with the above experiment.

Upon that basis we find that there was uselessly washed away 27,799 pounds of sugar. Add sugar obtained, 86,603, and, with a suitable crystallizing-room kept at a temperature of from 98° to 100°, the sugar product would have amounted to 114,402 pounds. This would have made the yield per ton of 66·3 lbs.; yield per acre 615·7 lbs.

This sugar was actually made, and was lost in separation by reason only of the fact that it could not be kept at the proper temperature. This difficulty can be overcome by having a crystallizing-room and having it kept properly heated.

In the next place sorghum requires hot summer weather for its proper development. As shown in our report, the average temperature during the part of the past season fell far below the usual summer temperature in this section, and was an average of 6° below the average of the same months of last year.

(2) Report of Professor Swenson.

Magnus Swenson[†] reports three experiments:—

	Stripped Cane. lbs.	Sugar. lbs.	Yield per ton. lbs.
Three and three-fifths acres gave	75,262	2,116·5	56·3
Two acres gave	28,974	1,008	70
One and one-fourth acres gave	17,112	594	69

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[*] *Op. cit.*, pp. 17, 18.

[†] *Op. cit.*, pp. 19 *et seq.*

Owing to the very backward season the growth of the cane was exceedingly slow.*

In respect of the purity of the juice Professor Swenson says:†

I do not believe that the average juice from the sorghum cane is of sufficient purity to allow of its being boiled to grain in the vacuum pan. I obtained a much coarser sugar by allowing the crystallization to take place in small tanks, and it was consequently much more easily separated.

Compare this with the statement of Professor Weber:‡

During our season's work in running the vacuum pan for sugar we did not fail at any time to produce crystals therein of proper quantity and desirable size.

(3) REPORT OF MR. PAUL STECK, OF SAN FRANCISCO, CAL.‖

Four hundred acres of cane were planted. Mr. Steck puts his daily expenses, aside from the cost of cane, at $235·50. His premium of $1,200 therefore only paid his running expenses for a little over five days.

I give below that part of his report where we might expect to find a statement of the quantity of sugar made. §

I manufactured from 600 to 650 gallons of syrup per day; average market price 50 cents per gallon. The reason why I could not manufacture sugar in quantity was on account of the juice not crystallizing in the vacuum pan, as cane sugar should do, so I was compelled to let the syrup run into tanks for crystallization. The syrup which I manufactured from this sorghum was superior to any in the market, both in colour and taste. The time required in making the alterations necessary and the putting in of large tanks, and other changes which I would have to make, was too short, so I converted the crop into syrup, as above stated. The sorghum syrup has a very slow crystallization, and the room in which it is kept should have a temperature of not less than 105°. It is a very important point in manufacturing sugar from sorghum not to bring the juice to boiling-point, as it checks the crystallization; therefore it should always be evaporated in vacuum pans (what we single, double, and triple effect), and also the cane brought to the mill should be manufactured into sugar or syrup within twelve to fifteen hours, as the longer it is exposed to air the more sucrose will turn to glucose. There should not be more cane cut in the field than can be worked at the mill each day.

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* *Op. cit.*, p. 20.

† *Op. cit.*, p. 23.

‡ *Op. cit.*, p. 15.

‖ *Op. cit.*, pp. 23 *et seq.*

§ *Op. cit.*, p. 25.

In the summary of his report, however, we have the following curious information: *

Number of acres of sorghum brought to the mill..	300
Number of tons of cane manufactured	3,600
The yield of sorghum per acre ....tons	15
The amount of sugar manufactured (about)....tons	5
The amount yielded per ton of cane (about)....lbs.	80 to 90

Mr. Steck, it seems, had equal difficulty in making sugar and computing yield per ton. Had heavy floods and frosts not occurred, and the factory had been large enough, Mr. Steck states that he would have made 288,000 lbs.† The loss of 278,000 lbs. is therefore to be attributed to the unfriendliness of nature.

Mr. Steck closes his report with a promise which he has never performed, viz.:—

> My intention next year is to manufacture sugar from sorghum, knowing the exact process necessary to its manufacture.

(4) REPORT OF NELSON MALTBY, GENEVA, OHIO. ‡

Mr. Maltby makes the following statement of his work: §

> I worked up cane from 17½ acres; the weight of the cane was 167 tons and 824 lbs., yielding a little over 9½ tons per acre. I made 1,466 gallons syrup not to be granulated. I made 1,095 gallons of syrup for sugar, weighing 12 lbs. per gallon, all of which grained well. I made 4,380 lbs. good dry sugar from the same. From some cane I made 72 lbs. sugar, and 112 lbs. syrup per ton. The average was 62 lbs. sugar and 124 lbs. syrup per ton.

(5) REPORT OF DRUMMOND BROS., WARRENSBURGH, MO. ‖

The number of tons of cane manufactured was 243, an average of 9⅙ tons per acre. The greater part of this product did not crystallize.

The sugar obtained was wholly from the Early Amber variety, and amounted to 1,464 pounds, being an average of 50 pounds per ton. Calculated on the whole quantity of cane, however, it is not quite 7 lbs. per ton.

Drummond Bros. make no complaint of the unfavourableness of the season.

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* *Op. cit.*, p. 25.

† *Op. cit.*, p. 26.

‡ *Op. cit.*, pp. 26 *et seq.*

§ *Op. cit.*, p. 27.

‖ *Op. cit.*, pp. 28 *et seq.*

(6) Report of A. J. Decker, of Fond Du Lac, Wis.[*]

Mr. Decker, in competing for the prize of $1,200 for sorghum-sugar making, naively remarks in his summary of operations:

	Gallons.
Full amount of syrup made this year............	3,600
Vinegar	800
Sugar (not yet swung out).[†]	

The date of Mr. Decker's report is not given. He says, however:[‡]

> On September 22 and 23 there was a sharp frost. The cane was mostly in blossom and the juice tested 5° B. Three months later it tested less than 6° B. There is, therefore, internal evidence that the report was written later than December 23.

This failure to separate the sugar may have been due to the small capacity of the centrifugal, which[§] "was small, 24 inches in diameter, 6 inches deep, with a capacity of 500 pounds per day."

In respect of the weather we learn:[‖]

> The season has been the most unfavourable of any known in this locality since the introduction of this crop.

Mr. Decker closes with a number of observations to which the preceding part of his report gives great emphasis:[¶]

> There are a number of points requisite to the development of sugar from sorghum as well as the process of manufacturing. First, is ripe cane; second, proper appliances; third, "the know how." The long-continued high degree of heat required in open-pan boiling, destroys nearly all the sugar long before the required density is reached, and under the most favourable circumstances not more than 1 lb. of sugar to the gallon can be expected from open-pan work, and that does not deserve to be called sugar making yet. I believe with the use of the vacuum pan and the skill to run it, sugar in the West is as certain as making flour from wheat.

(7) Report of William Frazier, Esofea, Vernon County, Wis.[**]

The weight of cane manufactured by Mr. Frazier was nearly 259 tons, grown on a little more than 41 acres. Mr. Frazier's success in sugar making cannot be properly appreciated save in his own words:[††]

> My report on this subject cannot be what I would like. I am able, however, to send you what I believe to be a pretty fair sample of crude sugar; it was dried from syrup made of Mr. Brigg's cane, dried by draining the syrup through a coarse cloth. Allow me to state here that my object has been syrup, with a view of making sugar in the near future. The most

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[*] *Op. cit.*, pp 31 *et seq.*

[†] *Op cit.* p. 36.

[‡] *Op. cit.*, pp. 31 and 32.

[§] *Op. cit.*, p. 35.

[‖] *Op. cit.*, p. 31.

[¶] *Op. cit.*, p. 36.

[**] *Op cit.*, pp. 36 *et seq.*

[††] *Op. cit.*, p. 38.

of my syrup was thoroughly grained one week after it was made. Had it granulate in the coolers frequently. My coolers are 8 inches deep and hold 40 gallons each.

On two occasions there was about an inch in the bottom of the second cooler so completely grained that it would not run out, although the melada was quite warm. I now have about 2,500 pounds of sugar in the bottom of syrup tanks, which I intend to throw out in the spring.

Mr. Frazier also finds fault with the weather: *

But the expected spring rains failed to come. It continued very dry until the 24th day of June, when nearly 4 inches of rain fell in one day, many heavy rains following, making it impossible to work our crops until the season was far advanced. I replanted my cane twice, but owing to the cold, dry spring, and to the ravages of the grub worm, failed to get half a stand on the 19-acre piece.

(8) REPORT OF THE JEFFERSON SUGAR CO., JEFFERSON, OHIO. †

We manufactured 33,850 lbs. of melada from the 190 tons of cane worked. We have not separated all of it in the centrifugal as yet; but it is running about 4 lbs. per gallon (or for every 12 of melada), from the first granulation. We expect on reboiling twice to raise the figures to 7 lbs. Last year we got 6 lbs. in every 12, with two boilings, from some of the best cane. If we do not succeed in getting more than 6 lbs. per gallon, we will have from the above figures 16,625 lbs. sugar. This would be nearly 90 lbs. sugar per ton of cane, and about 700 lbs. per acre of land. We feel assured of this much from the yield of that already separated; but we hope to obtain an average of 7 lbs. per gallon from all of the cane worked for sugar during the present season. If cane had fully matured we should not want to stop with less than 8 lbs. per gallon.

The weather, as usual, was bad:

The last two seasons have been the most disheartening ones for developing this new industry that our country has seen for years.‡

(9) REPORT OF THE OAK HILL REFINING COMPANY, EDWARDSVILLE, ILL. §

The report says: ||

And now we must state plainly that we have not manufactured sugar *on a business scale* this season. That is, we have simply made a small quantity as samples of our work, and contented ourselves with turning out the greater part of our products as syrup. We did this for several reasons.

In the first place, during the two previous years the juice, at its best (and seldom so), had been on the ragged edge; that is, scarcely enough sugar to crystallise under the most favourable circumstances. In 1880-81 the best "quotient of purity" (*i.e.*, polarisation divided by solid contents) was about equal to the lowest boilings in a sugar refinery, where a vacuum pan is needed, and three weeks' storage in a "hot room to insure a yield of 25 per cent. in sugar, and afterwards a bone-black filtration to give the syrup a sable colour. In 1881-82 the cane, if anything, was poorer; we had fine-looking ripe cane, the stalks of which were sticky with exuded juice; it had been in the society of the chinch-bug, and the juice polarised from 1 to 2 per cent. This year the chinch-bug had been hard at work improving the time as far as possible, and we knew what to expect.

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* *Op. cit.*, p. 41. † *Op. cit.*, p. 46. ‡ *Op. cit.*, p. 43.
§ *Op. cit.*, pp. 47 *et seq.* || *Op. cit.*, p. 51.

As to the weather, etc., the report says: *

The past three years the chinch-bugs have been very troublesome in this section. They have done great damage to the cane crop, especially severe in dry seasons, as the past three have been.

(10) Report of C. Bozarth, Cedar Falls, Iowa. †

Mr. Bozarth introduces his report as follows: ‡

I want to preface by stating that I have been in the business 24 years, and this has been the worst year for cane that we have had for 16 years. We had a very cold, wet, backward Spring. The cane was four weeks coming up, after which there were a number of hard frosts, the weather continuing cold and wet up to July, which so delayed the crop that it was not much past the bloom when frost came again on the 22nd of September, leaving the cane poor in sweetness and weight, both marking only 6° to 8° Baumé and averaging not more than 7°. I have made but little sugar this season, hardly enough to pay for running through the centrifugal machine, and inasmuch as the syrup is a good price, I have not thought best to put it through for the little that is in it, although there is a considerable granulation through all my syrup, fully as much this year as I could expect, and more, considering the quality of cane. Last year I had 5,000 lbs. that sold in the market for 8½ cents per lb., and the year before 15,000 lbs. that sold for 8 cents per lb. I raised this year, on my own farm, 85 acres, which was all worked without stripping.

The introduction contains all there is in this report concerning the production of sugar.

The results of the experiments just abstracted are appropriately preceded by a summary made by the Commissioner of Agriculture of the experiments which had been made up to that time by the Department of Agriculture in the production of sugar from sorghum. He says: §

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* *Op. cit.*, pp. 55. † *Op. cit.*, pp. 57 *et seq.* ‡ *Op. cit.*, p. 57. § *Op. cit.*, p. 3.

On assuming the duties of my office in 1881 I found 135 acres of sorghum, containing fifty-two varieties, which had been planted in Washington for the use of the Department. On being informed that the time had arrived for manufacturing syrup and sugar, I engaged the services of an expert in sugar-making who had been highly recommended for the position of superintendent, and operations were commenced on September 26 at the mill erected by my predecessor on the grounds. These operations were continued with slight interruptions until the latter part of October, at which time the supply of cane became exhausted. Forty-two acres of the crop were overtaken by frost before being sufficiently ripe for use, and this portion of the crop was so badly damaged as to be unfit for manufacture. The yield of cane per acre on the 93 acres gathered was 2½ tons; the number of gallons of syrup obtained was 2,977, and the number of pounds of sugar was 165. The expense of raising the cane was $6,589·45, and the expense of converting the cane into syrup and sugar was $1,667·69—an aggregate of $8,557·04.

To recapitulate the results of the ten experiments, I give the following table:

Sugar made.	lbs.
No. 1	86,603
No. 2	3,718·5
No. 3 (about)	10,000
No. 4	4,380
No. 5	1,464
No. 6	0,000
No. 7	0,000
No. 8 (estimated)	10,000
No. 9	0,000
No. 10 ("a little")	......
Total sugar	116,165·5

Amount of premium given $12,000. Amount per pound (nearly 10·3 cents.

St. Vincent.—The Blue Book of St. Vincent (West Indies) for the past year describes it as the very worst year that this Island has ever experienced. The revenue fell short of the expenditure by £3,000. The public debit is close upon £10,000. The imports were in value 10 per cent. less than in the previous year, and 20 per cent. less than the year before that. Four-fifths of the sugar goes to the United States, and one-fifth to Great Britain. The population is about 45,000.

MR. DANIEL MORRIS ON THE WEST INDIES.

With an Address by Mr. Thistleton Dyer on the Sugar Bounties.

At a meeting in the College Hall of the Richmond Athenæum, on November 12, Mr. D. Morris, M.A., F.L.S., assistant director of Kew Gardens, delivered a lecture, entitled "Aslant the Sun; or the Sugar Islands of the West." On the platform were maps and engravings, and on tables were arranged a variety of the products and manufactures of the West Indies. In addition to these Mr. W. Duppa Crotch, of Richmond Green, very kindly lent a choice collection of water colour drawings which he had made when residing in the West Indies.

Mr. Thistleton Dyer, Director of Kew Gardens, presided.

Mr. Morris said he wished to give them a general idea of the circumstances of these islands, so that if possible they might realise what they really were like. For the title he was partially indebted to the Bishop of the diocese—which he hoped would give his lecture sound orthodoxy (laughter)—because the Bishop had himself been to Jamaica and some other islands in the West Indies, and some time ago he wrote a very interesting series of articles in *Good Words*, entitled "Aslant the Sun."

The first island they would touch after leaving England by a mail steamer for the West Indies would be Barbadoes, 3,500 miles across the Atlantic. On reaching this island they would undoubtedly expect to see some vegetation of the tropics, but they would be somewhat disappointed. From the sea Barbadoes looked very much like the Isle of Wight. There were the white chalky cliffs, and the land, all under cultivation, was laid out in beautiful terraces of sugar cane. Here and there they would see windmills, with their sails revolving in the wind. These mills set the machinery in motion for the purpose of crushing the sugar cane. If they got nearer the land they would find in the interior of the island beautiful country residences surrounded by trees that looked very much like elm trees, but were mahogany trees, planted around farmhouses and the homes of the planters for the purpose of sheltering them from the strong winds. When the West Indies were discovered they were very different from what they are now. Columbus was the first to open up these islands to western civilisation, though it was questioned whether he was the first discoverer. The area of the West India Islands was equal to about twice that of the United Kingdom. British Guiana, for instance, was twice the size of Ireland; British Honduras was about the size of Wales; Jamaica was about equal to Yorkshire. The trade in comparison to area was great. That of Barbadoes amounted to more than a million sterling. These islands were about the oldest of our possessions, and had cost this country an enormous amount both in men and money. It was a history full of romance. Originally the Spaniards claimed the whole of the islands as their own, and claimed the natives also as belonging to the Roman Catholic Church. But under their harsh rule the natives were swept out of existence, so that islands were found at the English occupation without a single native on them. When the Spaniards took possession of the New World, both English and French disputed their claims, and tried the question at the cannon's mouth. The theatre of the grandest battles during that period was in the West Indies. The headquarters of the buccaneers was Jamaica, which was also the centre of the trade with the mother-country in the West Indies. These islands were in a fairly prosperous condition until the English became involved with America. Then France, Spain, and Holland combined to tear from the English their power in this quarter of the globe. One of the severest battles in naval history was fought off the small Island of Dominica.

Mr. Froude had written an interesting book on the West Indies. It was full of errors, but its historical part was well worth reading. This battle, Mr. Froude said, was the turning point in our history in the West Indies. The American colonies were wrested from us, but England kept her hold on the West Indies. When we had established our authority in the West Indies the English planters went out there and settled in them. According to geologists, the physical circumstances of the West Indies had been very much the same as now. There was a strong current from South America, sweeping into the Caribbean Sea and going into the Gulf Stream. Everything was on this account carried westward. As proof of this, at Jamaica, British Honduras, and other of the islands, there were continually found seeds of plants carried from the east and deposited on their coasts. In addition to the ocean current that swept into the Gulf, they had trade winds nine months in the year blowing from the north-east, and carrying everything to the westward.

As regards the age of these islands, he did not know so much about Cuba and Hayti, but as regards Jamaica it was not old in respect to geological age. The latest part of it belonged to the cretaceous age—that was to the chalk period. If they began to touch on the continent of South America, as in British Guiana, they found some very old rocks indeed, and in those they were now finding gold. As regards minerals in the other islands, there were practically very few known.

The islands depended upon the plants and upon the resources of the soil. In May and October rain was pretty regular throughout the West Indies. People knew when rain was coming, and arranged their plans accordingly. From Christmas to the month of May the climate was dry, and operations incidental to tropical countries took place. When the May rains came everything was stopped for the time, and when it was over people began planting again. In October began the Autumn planting, which was continued till the rain was over, and the warm weather came and everything began to shoot. When the islands were first discovered they were covered with trees, but the planters soon cleared the lowlands. First of all they grew the sugar cane from which were made sugar, rum, and molasses. Indigo was also cultivated, and coffee and various other plants. But in some of the smaller islands, in the north especially, and clearing of the forest was done so quickly and with such little care that they were now almost entirely barren. Beautiful mahogany trees grew in Honduras. Out of the forest was also got logwood. In the lowlands the thermometer was very high, usually at 78 or 80 degrees, so that everything grew very quickly. The sugar cane industry was found very profitable originally, that is when it was £60 a ton instead of £15 as now. The cane was cultivated by blacks, who were originally slaves from Africa. The pimento which produced allspice grew naturally and only needed the clearing away of the weeds. All the islands grew tobacco though Cuba produced the best. In Jamaica ginger was an extensive industry. In the western parts of the island, what was called Guinea grass grew luxuriously. It was not a native and was curiously introduced. Immigrants brought some birds from the coast of Africa and with them the seeds of this grass on which they fed. The birds died and the seeds being thrown away sprang up with the best results for the feeding of animals, such as horses, cows, &c.

In all of the islands British law was established. People were as safe in the West Indian islands as in this country. The governor was appointed by the mother country and the Government was composed of a Legislative Council, partly of officials of the colony and partly of men nominated by the Crown. Hence they were called Crown Colonies in contradistinction to such self-governed colonies as Canada and Australasia. On the whole the system of government worked very well. Barbados had a government of its own, which was elected by the people themselves. As regards the people inhabiting these islands they were nearly all black people. Jamaica contained 15,000 white people and 700,000 negroes. These negroes had a certain amount of political power given to them, and were being educated in order to enable them to exercise it aright.

Few of the islands except British Guiana had an established religion; all the others were self-supporting. The negroes were people easily influenced with regard to religion, but he was afraid it did not go very deeply with them. They were very fond of attending church on Sunday and appearing gaily dressed. Few native races were so tractable and so easily managed as the negroes in the West Indies. Insurrections had taken place, but if they were treated kindly and firmly they need have very little fear of the negroes of these islands.

Mr. Morris spoke of the enterprise of the planters in these islands, who, he said, were somewhat under a cloud just now. If the mother country, however, treated them in a generous manner, their prosperity would return to them. Logwood was introduced into Jamaica from British Honduras by Dr. Barham, and now Jamaica exported more logwood than British Honduras. Mango trees were also introduced there, and the island was now covered with them, and on them the negroes largely depended for their food. (He here showed some specimens of West Indian ebony and other native products.) For natural beauty, he said, no part of the world could compare with these islands, and wonderful and interesting things were to be found there. He did not advocate that white people should go out to the West Indies and live and work there as they would in a temperate country. But for those people who were able to employ labour, and establish coffee or cocoa plantations, he knew of no place where they would do better than in the West India Islands.

The chairman (Mr. Thistleton Dyer) said he felt sure he might convey to Mr. Morris the thanks of the meeting for his admirable address. It had been said that our Imperial interest in the West Indies were comparatively insignificant. But when they heard that these possessions in the aggregate had an area as large as Italy, which now ranked as a first-rate European power, he thought that that view could hardly be sustained. Apart from that, he thought that the atmosphere of romance with which, from their first discovery the West Indies had always been invested, ought to make us take a real pride in these beautiful jewels of the Imperial Crown. Of late years their material prosperity had left much to desire; but he hoped that better prospects were in store for them. He might be allowed, perhaps, to explain briefly the cause of their depression, and the ground for hoping that it would eventually pass away. An attentive study had been made at Kew for many years of the measures which might be taken to place the material resources of the islands on a better footing. Mr. Morris had been sent out to Jamaica by the Government to carry out the policy suggested by Kew, and he was glad to say that, as regarded the island, his efforts had been crowned with a large measure of substantial success; in that success he hoped the other islands would also eventually share. Mr. Morris had pointed out that the earliest and most important cultivation in the West Indies was of the low lands for sugar. This had ceased to be the profitable industry that it had been, and though in Jamaica the prosperity of the colony was not wholly dependent on that staple, in others, such as Barbados, it was difficult to see in what other direction agricultural enterprise could be turned.

He should like to take the opportunity of explaining to them the reasons of the difficulties in which the West Indian and other sugar-producing colonies found themselves. The matter was, perhaps, not so very well understood, but he had had at Kew, to make it a subject of careful study. It arose from what were known as the sugar bounties. To understand these it was necessary to go back a little into history. Everyone knew that one of the most cherished objects of the first Napoleon was to break the power of England. After being baffled in a variety of direct attempts, he invented a method which undoubtedly inflicted upon it a serious blow. By what was called the "Continental System," he succeeded in excluding from Continental Europe British colonial produce. Now this deprived residents on the Continent of an adequate supply of sugar, a substance which, it should be remembered, was not merely a luxury, but an essential article of food. In this dilemma the experiment was made of extracting sugar from the beet. In the early stages of this industry it presented great difficulties; but by a process of continued selection a beet had been obtained with a continuously larger proportion of sugar, and every scientific refinement had been lavished on the manufacture. It was quite certain that the success which had been attained would have been impossible unless the beet sugar manufacture had been protected by heavy import duties. And, in point of fact, it had always remained a highly artificial industry, which, even up to the present time, was perhaps scarcely able to hold its own without protection. But it was none the less wonderful as an example of what could be effected by the highest application of scientific skill and commercial energy.

All this was plain sailing, but the origin of the so-called bounties was more obscure. It was generally necessary, when an article of trade was protected by an import duty, to impose an internal tax, or otherwise the temptation to smuggling would defeat the object aimed at in the imposition of the import duty. In the countries, then, in which sugar was manufactured from beet, the process of manufacture was taxed. The tax was not levied on the manufactured product, but on the raw material, so to speak. The amount was fixed by the excise on certain accepted principles—the manufacturer paid the tax on the estimated quantity of sugar which he could make from a given quantity of beetroot. Having done that he proceeded to use every resource of skill and art in order to extract from the beet the utmost possible amount of sugar. Supposing, for the sake of illustration, he paid the tax on one ton of sugar, then he would proceed to extract from the beet a larger amount, say one ton and a-half. It was clear that he got half a ton on which no duty had been paid. Well, if he sold his sugar for internal consumption he was, of course, so much to the good. But if he sent it out of the country he was allowed by the Government, as drawback, the full amount of duty, of which part only had been really paid. It was this allowance of an unpaid duty which constituted the bounty. It was clear it was only earned by sending the sugar out of the country, and it was easy to see that it enabled sugar-manufacturing countries to export an enormous quantity of sugar, which they could sell in foreign markets at a great profit to the manufacturers. But it did not help the internal consumer, who had to pay something like tenpence a pound for sugar which we get for something like threepence, and had also to find in the shape of taxes, the money to pay the bounties. The sum to which these had mounted up were almost incredible. In France and Germany they were over £3,000,000, in Austria over £1,000,000, in Belgium and Holland £800,000 and £300,000 respectively. Altogether this totalled up to something like £9,000,000 a year.* This was a frightful burden, and one which it might be easily imagined, under similar circumstances, in our own country, would not be tolerated for a moment.

It was natural, then, that the governments of the sugar-producing countries should be anxious to get rid of the bounties. No one country, however, dared to take the initiative, because, if it did, it would be flooded with cheap sugar from the others, and its own sugar manufacture destroyed. Bounties, it was clear, could only be abolished if everyone agreed simultaneously to give them up. Why, however, it may be asked, should we interfere? How did the matter affect ourselves? Well, in the first place, we no doubt, got an abundant supply of cheap sugar, for which other people paid in great measure. So great had at one time been the glut of sugar in the London market that it paid to send back some of the sugar to France, pay the duty, and still make a profit. Our own refining industry on the other hand had been seriously injured. Still we had in consequence of the cheapness of sugar, carried off from France a large slice of its own peculiar industry of confectionery; and, as we all knew, a great impulse, it had been supposed, had been given to the manufacture of jam. We were so far clear gainers, and Sir Thomas Farrer had urged with great force that it was unpatriotic to take away so inestimable a boon as the general cheapness of sugar conferred upon us. His answer to this was, that this cheapness rested on an artificial basis, with no guarantee of its permanence. It appeared to him that it is bound sooner or later to come to an end, and looking at the matter from a purely selfish point of view, it is eminently desirable that it should be sooner, for the production of sugar from the sugar cane under present circumstances is seriously crippled. If those circumstances continue, capital will cease to be invested in sugar production in tropical countries, machinery will get antiquated, mills out of repair, and the whole industry will sink to a condition from which it will take a long time to extricate it.

If then the sugar bounties come to an end, what would be the state of things? The production of sugar from the beet would be restricted, the deficiency could not at once be supplied from the sugar cane, and the price of sugar would rise to a very inconvenient extent, and we should practically be at the mercy of foreign producers. If on the other hand the bounties are abolished now, the sugar cane will come into national competition with the beet, manufacturers in either case will be stimulated to do their utmost, and though perhaps for a short time there may be a slight rise in price, sugar will in the long run be as cheap as ever, and we shall not be dependent on a single and highly artificial source of supply. This will give a great impulse to the prosperity of our sugar-producing colonies, and in this the West Indies, in which your interest has been so agreeably excited to-night, will undoubtedly largely share.

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* See footnote on page 636.

Mr. Duppa Crotch remarked upon the points of similarity in the flora and fauna of the West Indies with the Canary Islands. The subject of the aboriginal population of the islands was also interesting. Might they not ask Mr. Morris to give in another lecture a continuation of the present lecture?

Mr. Rolfe observed that the islands running up from Trinidad to the North were very similar in their flora, and there was evidently an archipelago of islands running northward which had not been connected with the continent of South America. It was a very interesting thing however that Trinidad and Tobago were very different in their flora from that of the islands of the north. He thought that the explanation given was the true one, that those islands were connected with the continent of South America for a considerable time, during which there was a diffusion of plants thence and also from the north. But then a separation took place, and the line of cleavage was to the north of Trinidad.

In reply to a vote of thanks which was heartily passed to the chairman and the lecturer, Mr. Thistleton Dyer thanked the meeting, and said that they had a good deal of work to do at Kew, and regarded an evening like that as an outing. It would give him great pleasure to be present whenever possible.

Mr. Morris said as regards Obeahism, he found nothing in his seven years' residence among the negroes different from what they would find among ordinary English people. Having referred to what he considered would be the great future of these islands, he promised to consider the desire that he should give a further lecture thereon.

Mr. W. Duppa Crotch writes as follows:—

Owing to the lateness of the hour at which Mr. Morris' most interesting lecture, and the valuable remarks of Professor Dyer concluded, I thought it best to confine myself to the wish, which happily appeared to be unanimous, that the lecturer might be induced to continue his account of our Crown colonies in the West Indies at an early date; but as it appears improbable that this wish can be gratified for some months, I should much like at once to express my sincere thanks to Mr. Morris for his kindness and hospitality to my daughter and myself during part of our sojourn in Jamaica, and also to join issue with him on the question of the negro. Personally I believe that the free negro is the curse of Jamaica. Mr. Morris says that his experience during seven years leads him to think that, with kindness and firmness, he is equal to any European servant. But it must not be forgotten that Mr. Morris held an official position in the island, and was enabled to offer not only constant employment, but a better rate of wages than the impoverished planters, and that he thus attracted to himself that sprinkling of more or less industrious men which may be found even among the negroes.

The planters, however, have a different experience, and so strongly do they feel the impossibility of relying on native labour that they have imported coolies to take their place, with results into which I will not enter now. The negro squats and clears practically almost where he chooses, since so many once flourishing estates are now reduced to such abject bankruptcy that the land has reverted to its former state of jungle, and he generally pays no rent. He lives on the fruits which the whole earth has been ransacked to provide for him—cocoa nuts, bread fruit, mangoes, &c.; and he does no regular work, except for an occasional day or two, in order to earn a few shillings to buy rum, or some article of finery. He will make a contract to-day for a week's work, and break it to-morrow, and if that contract should be, for instance, for the loading of a schooner with ripe bananas, such a breach means little less than ruin to the planter. The position of the negro is thus far more easy than that of the British workman, who may not break contracts, and if he will not, or cannot work, must starve, or go to the workhouse. With all these advantages he is hardly happy, for he likes to be compelled, and to be his own master is, for him, the worst of slavery. Nor is he kind to his aged parents, many of whom assured me that they heartily wished they were slaves again. It is the younger generation which is to be dreaded. If the negro is to have a voice in the Legislature—and their numbers are now so great that this has almost become a political necessity—the state of Jamaica might become that of Hayti. Meanwhile a strangely counteracting influence is slowly being developed—that of "miscegenation." The whity-brown simply detests the black, and far from feeling hurt at any abuse of his coloured kinsfolk, he will be the foremost to attribute the ruin of the country to them. In Barbados the case is different. There is there no uncultivated ground; and the negro, under the compulsion of that sternest taskmaster—necessity—has become, perforce, industrious. With regard to Professor Dyer's most lucid account of the sugar bounties, it is to be feared that their abolition would not restore prosperity to Jamaica, unless aided by some compulsory labour laws, which are very unlikely to be enacted. And this is the more to be apprehended from the fact that the other industries of the island, such as coffee, cinchona, tobacco, &c., cannot be said to have yielded satisfactory results. I therefore believe that the labour question is at the root of the distress in Jamaica, and I fear that no acceptable solution of that difficulty is likely to be propounded. And yet, no more lovely, fertile, and saddening island exists, than that which lies so pleasantly in the "Slant of the Sun."

CALCULATED INCREASED YIELD BY NITROGENOUS MANURINGS FOR THE SUGAR CANE.

The following letter on this subject, under date November 10th, from Professor J. B. Harrison, is taken from the *Barbados Agricultural Gazette*:—

When reading a paper before the society, two years ago, upon the selection of manures for the sugar cane, I pointed out the grave danger attending our trusting solely to the opinions of European chemists and manure makers as to the composition of the manures which we use. A striking instance of this occurs in a recent work, written by Dr. Wagner, entitled "The increase in the produce of the soil through the rational use of nitrogenous manures." On page 12 of this work is a table giving the average increase in the yield of different crops which nitrate of soda can produce as calculated from the average proportion of nitrogen which they contain, and in it we are informed that a manuring of 100lb. of nitrate of soda will, on the average, produce 2,000lb. of sugar cane. If this statement is correct, the system of manuring adopted throughout the island for the past five years, during which low prices for our staple have prevailed must have been a wrong one.

In the table it is not stated whether sugar cane means stripped canes or total produce of canes (canes, leaves, and tops); judging from the rest of the table the latter is the more probable. It is therefore necessary to consider it in both ways. In a favourable year

100lb. of stripped canes will yield from eight to nine pounds of dry muscovado sugar; taking the higher figure, 2,000lb. will produce 180lb., worth at $2·25 per 100lb. $4·05, and as 100lb. of nitrate of soda, or its equivalent in sulphate of ammonia, would cost, on the average, when applied to the field $3·00, we get, assuming the molasses obtained to cover the expenses of reaping, &c., an apparent profit of $1·05 for each 100lb. of nitrate of soda applied. If by sugar cane is meant total field produce the result is somewhat different. The results of a great number of experiments have shown that in 100lb. of produce of the sugar cane in this island, 70lb. on the average, consist of stripped canes; the nitrate of soda will then produce 1,400lb. of canes yielding 126lb. of muscovado sugar, and cause a loss to the planter of 16cts. From Dr. Wagner's figures it therefore appears to be a most risky thing for sugar cane producers to use, during periods of low prices, nitrogenous manures, a result contrary to all experience.

It is interesting to calculate from the known composition of the sugar cane, after the manner adopted by Dr. Wagner when drawing up his table the average yield of sugar cane by 100lb. of nitrate of soda and to compare the figures thus obtained with his. From the analysis given by Boname in his recent work on the culture of the sugar cane in Guadeloupe, the whole cane (cane and cane top) as there grown contains ·093% of nitrogen. The results of upwards of one hundred analyses made here show that well manured canes contain on the average ·107% of nitrogen. The mean of these figures gives ·10% as the probable average amount present in the whole cane. In 100lb. of the produce of the sugar cane during its growth, about 83 will be canes and cane tops which are reaped and 17 fallen leaves (calculated in their green state). The leaves of the cane just before falling contain about one-fifth less nitrogen than the growing ones, the average contents of which is ·21%, the fallen leaves will therefore have contained about ·17% of nitrogen, giving as the average for the total produce ·112%. Calculating in the manner adopted by Dr. Wagner, 10lb. of nitrogen will be contained in, and 100lb. of nitrate of soda should produce, in round numbers, 9,000lb. of produce, of which 6,300lb. would be canes and 1,170lb. cane tops. This gives an apparent profit of $9·75 as resulting from the application of either 100lb. of nitrate of soda, or its equivalent amount of nitrogen in sulphate of ammonia or in commercial sugar cane manures.

The figures thus obtained agree much better with the results of our planters, and show clearly that theoretically in accordance with our agricultural practice, the economic production of the sugar cane depends upon manurings of readily available nitrogen in suitable quantity, and that the course pursued by our planters during recent years has not been such a risky one as it appears to be when judged by Dr. Wagner's figures.

MONTHLY LIST OF PATENTS.

Communicated by Mr. W. P. Thompson, C.E., F.C.S., M.I.M.E., Patent Agent, 6, Lord Street, Liverpool; 6, Bank Street, Manchester; and 323, High Holborn, London.

16395. A. Leblanc, Havana, Cuba. *A new and useful improvement in sugar cane mills.* (Complete specification.) 12th November, 1888.

16397. F. Bauder. *Improvements relating to the refining of sugar and to the treatment of syrup obtained therefrom.* (Complete specification.) 12th November, 1888.

GERMAN.

ABRIDGMENTS.

44529. C. Leuchtenberger, Berlin; and B. Moiske, Franfurt, a. O. *Improved process for obtaining a pure uncrystallising syrup from molasses.* 16th December, 1887. The molasses is inverted in a vacuum by the acids liberated during the decomposition of the molasses salts with sulphuric acid, and at the same time the volatile acids are evaporated. The non-volatile acids are precipitated with barium carbonate.

44660. G. Adant, Brussels. *Improved centrifugal machine with a removable drum for producing layers of sugar in the manufacture of beetroot sugar.* 1st January, 1888. The centrifugal apparatus consists of a removable drum, provided with shaping-plates and sieves. This drum is placed in a shape, and the saccharine matter introduced into it through a hopper and pipes, the said matter being finally forced into the shape by inserting a rod in the channels. When the sugar stiffens, the drum is placed on a framework, and closed in by a conical surface projecting from the base of the frame and by a lid. The clarifier is brought from a filtering apparatus placed above, through a pipe which is locked on by a collar bush, and which is furnished with a tap. The said clarifier passes through a channel into a cavity in the frame, and thence it reaches the saccharine mass.

44903. PFEIFER and LANGEN, Cologne. *Improvements in sugar breaking apparatus.* 10th April, 1888. On the table, in front of the knife, a clamp is placed, which enables the cakes of sugar to be arranged in layers, one above the other, and then to be pushed forward, one after the other into the knives, by means of carriers.

44747. H. W. WALKER and T. L. PATTERSON, Greenock, N.B. *Improvements in centrifugal machines, with horizontal axle for forming and refining sugar.* 10th January, 1888. This centrifugal apparatus is used for producing cakes of sugar which have to be broken up into tubes. The sugar mould, the outer wall of which forms the fixed unperforated centrifugal drum; is a segment of a cone furnished with a number of circular plates projecting on the inside ; the inner wall forms a slightly conical and removable cover. After inserting the circular plates, the centrifugal apparatus is filled with sugar by a rotary motion, and this sugar is equally divided between the plates. The inner cover is then put on, the centrifugal machine or sugar mould taken off its axle, laid with its axis vertical, and left till the sugar stiffens. The mould is then replaced on the axle, the raw syrup extracted by revolution, and the cover put on. The syrup enters all the interstices between the circular plates, and flows first in a radial direction to the outer wall of the centrifugal machine, and then along this wall to its furthest extremity, and thence into a receiving pipe which surrounds the apparatus.

BELGIAN.

ABRIDGEMENTS.

70592. SICRE DE FONTBRUNE, Brussels. *Improvements in the manufacture of sugar.* October 22nd, 1885. The invention relates to the new application of steeping in a suitable sugar syrup the products obtained by submitting the boiled mass to a first operation in the centrifugal, and this for the purpose of agglomerating the crystals and avoiding costly operations.*

Patentees of Inventions connected with the production, manufacture, and refining of sugar will find *The Sugar Cane* the best medium for their advertisements.

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* For want of room this month we have had to hold over until January several pages of patents.

PRESENT AND PROPOSED UNITED STATES' SUGAR TARIFFS.

In a recent number of *The American Grocer* is given the present tariff, the tariff proposed by the Mills' Bill, which may now be looked upon as dead, and the Senate (or Republican) Bill, which is substantially a reduction of one-half:—

Polariscope test, deg.	Present Duty.	Mills Bill.	Senate Bill.
75	1·40	1·150	·70
76	1·44	1·182	·72
77	1·48	1·214	·74
78	1·52	1·246	·76
79	1·56	1·278	·78
80	1·60	1·310	·80
81	1·64	1·342	·82
82	1·68	1·474	·84
83	1·72	1·406	·86
84	1·76	1·438	·88
85	1·80	1·470	·90
86	1·84	1·502	·92
87	1·88	1·534	·94
88	1·92	1·566	·96
89	1·96	1·598	·98
90	2·00	1·630	1·00
91	2·04	1·662	1·02
92	2·08	1·694	1·04
93	2·12	1·726	1·06
94	2·16	1·758	1·08
95	2·20	1·790	1·10
96	2·24	1·822	1·12
97	2·28	1·854	1·14
98	2·32	1·886	1·16
99	2·36	1·918	1·18
100	2·40	1·950	1·20
No. 13 D. S. and not above No. 16 D. S.	2·75	2·20	1·375
No. 16, not above No. 20	3·00	2·40	1·625
No. 20 D. S.	2·50	2·80	2·00
Molasses not above 56 deg. per gal.	·04	·04	free.
,, above 50 deg.	·08	·06	·04

MR. GÖRZ'S ESTIMATE OF THE BEET SUGAR CROP IN EUROPE, 1888-89.

Compared with the Actual Crops of the three preceding Campaigns.

	1888-89. Tons.	1887-88. Tons.	1886-87. Tons.	1885-86. Tons.
Germany	955,000	935,000	1,015,600	838,105
Austria Hungary	550,000	400,000	550,000	369,000
France	490,000	420,000	497,000	298,408
Belgium	95,000	93,000	91,100	48,420
Holland a. s.	65,000	55,000	50,000	37,500
Russia	450,000	430,000	455,000	526,200
Total	2,605,000	2,333,000	2,658,600	2,117,633

The Approximate Consumption Mr. Görz gives as follows:—

	1887. Tons.	1886. Tons.	1885. Tons.
Germany	420,000	418,000	409,000
Austria Hungary	260,000	255,000	250,000
France	452,000	445,000	439,000
Russia	370,000	348,000	330,000
Holland and Belgium	80,000	78,000	76,000
England	1,179,000	1,107,000	1,150,000
Europe (others)	315,000	302,000	290,000
	3,076,000	2,953,000	2,944,000
United States	1,370,000	1,275,000	1,181,000
Total	4,446,000	4,228,000	4,125,000

For Mr. Licht's figures for same periods, see page 677.

IMPORTS AND EXPORTS (UNITED KINGDOM) OF RAW AND REFINED SUGARS.

January 1st to October 31st, 1887-1888.

Board of Trade Returns.

IMPORTS.

Raw Sugars.	Quantities.		Value.	
	1887.	1888.	1887.	1888.
	Cwts.	Cwts.	£	£
Germany	5,662,666	3,784,204	3,155,451	2,464,871
Holland..................	333,799	254,770	180,492	163,235
Belgium	648,818	491,392	351,267	312,579
France	49,266	16,201	28,400	11,932
British West Indies & Guiana	1,950,247	1,856,195	1,368,295	1,475,746
British East Indies	564,366	968,037	262,029	465,849
China and Hong Kong	312	10,733	201	6,420
Mauritius	104,133	245,729	56,995	166,272
Spanish West India Islands	174,758	304,496	108,130	223,544
Brazil	720,714	2,132,549	384,171	1,341,821
Java	2,927,415	3,198,906	1,886,879	2,383,005
Philippine Islands	386,634	641,954	174,730	305,140
Peru	339,167	430,455	206,325	319,297
Other Countries	491,092	635,281	277,310	463,498
Total of Raw Sugars ..	14,353,387	14,970,902	8,440,675	10,103,209
Molasses	279,971	327,391	92,003	102,090
Total Sugar and Molasses	....	....	8,532,678	10,205,299
Refined Sugars.				
Germany	2,069,144	2,318,268	1,574,410	2,021,522
Holland..................	1,201,809	1,160,777	929,316	1,051,526
Belgium	169,422	163,698	140,319	155,991
France	1,173,608	804,057	890,543	723,319
United States	777,111	40,352	622,965	37,713
Other Countries	101,029*	391,374*	72,178	311,429
Total of Refined	5,492,123	4,878,526	4,229,731	4,301,500
EXPORTS.—Refined Sugars.				
	Cwts.	Cwts.	£	£
Sweden and Norway	61,788	64,248	43,581	53,254
Denmark	95,101	81,372	54,344	59,925
Holland	61,594	72,486	41,115	52,857
Belgium	34,067	25,400	20,751	17,685
France	29,484	6,512	18,431	4,546
Portugal, Azores, & Madeira	69,272	62,154	41,019	45,189
Italy	80,950	76,222	51,994	56,332
Other Countries	159,964	167,556	110,762	130,675
Total of Refined	592,220	555,950	381,997	420,463

* Entirely from Russia.

IMPORTS OF FOREIGN REFINED SUGAR.

The British Sugar Refiners' Committee furnish us with the following figures, giving the imports of foreign refined sugar for the month of October, 1888, compared with the corresponding month of the two preceding years, and the average monthly imports for the year compared with those of 1885, 1886, and 1887, distinguishing the quantities of "Lumps and Loaves" from "other sorts," and giving the separate imports from each country:—

Countries from which Sugar has been imported.	"Lumps and Loaves."							"Other Sorts." Including Crushed Loaf, Granulated, Crystallized, &c.							Total.						
	Monthly Average.				Oct.	Oct.	Oct.	Monthly Average.				Oct.	Oct.	Oct.	Monthly Average.				Oct.	Oct.	Oct.
	1885	1886	1887	1888	1886	1887	1888	1885	1886	1887	1888	1886	1887	1888	1885	1886	1887	1888	1886	1887	1888
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
France	1597	1462	1363	1633	2417	961	1416	463	2688	5099	2386	4665	2199	10037	2060	4150	6462	4019	7082	3160	11153
Holland	3848	3508	3780	3204	4259	4403	3001	1472	1428	2483	2599	1507	2959	3609	5320	4936	6263	5803	5766	7362	6610
Germany & Austria	808	990	1347	1293	758	353	446	3262	6634	10463	10298	6822	8059	5940	4070	7624	11810	11591	7580	8412	6386
Belgium	189	344	592	595	474	679	444	120	113	308	223	122	261	211	309	457	900	818	596	940	655
United States	707	851	454	10	1111	74	..	8869	5078	2801	192	8076	93	10	9576	5932	3258	202	9187	167	10
Russia	..	..	3	..	..	..	..	875	3412	452	1955	..	1127	87	875	3112	455	1955	..	1127	87
Other Countries	1	..	..	1	..	..	..	24	9	15	1	..	..	..	25	9	15	2	..	..	..
Total	7150	7158	7539	6736	9019	6170	5307	15085	19362	21624	17654	21192	14698	19894	22235	26520	29163	24390	30211	21468	25201

SUGAR STATISTICS—GREAT BRITAIN.

To November 24th, 1888 and 1887. In Thousands of Tons, to the nearest Thousand.

	STOCKS.		DELIVERIES.		IMPORTS.	
	1888.	1887.	1888.	1887.	1888.	1887.
London	26	47	282	292	255	263
Liverpool ..	106	79	293	246	315	249
Bristol	2	3	45	53	44	52
Clyde	14	35	226	213	197	212
Total ..	148	164	846	804	811	776
	Decrease ..	16	Increase ..	42	Increase ..	35

SUGAR STATISTICS—UNITED STATES.

(From Messrs. Willett & Hamlin's Circular, New York.)

For the four principal Ports. In Thousands of Tons, to the nearest Thousand. For October, 1888 and 1887.

	STOCKS. November 1st.		DELIVERIES. In October.		IMPORTS. In October.	
	1888.	1887.	1888.	1887.	1888.	1887.
New York	44	60	47	76	41	38
Boston	6	12	13	17	13	15
Philadelphia....	—	—	12	7	11	6
Baltimore	..	..	..	..	..	..
Total......	50	72	72	100	65	59
	Decrease ..	12	Decrease ..	28	Increase ..	6
Total for the year (1888)..			931	1025	933	994

STOCKS OF SUGAR IN THE CHIEF MARKETS OF EUROPE ON THE 31ST OCTOBER, FOR THREE YEARS, IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts*.	TOTAL 1888.	TOTAL 1887.	TOTAL 1886.
152	80*	3*	135*	115	12	497	646	665

*Estimate.

CONSUMPTION OF SUGAR IN EUROPE FOR THREE YEARS, ENDING 31ST OCTOBER, IN THOUSANDS OF TONS, TO THE NEAREST THOUSAND.

Great Britain.	France.	Holland	German Empire.	Austria.	Remaining four principal *entrepôts*.	TOTAL 1888.	TOTAL 1887.	TOTAL 1886.
1228	443	39	426	224	349	2709	2668	2580

ESTIMATED CROP OF BEET ROOT SUGAR ON THE CONTINENT OF EUROPE FOR THE PRESENT CAMPAIGN, COMPARED WITH THE ACTUAL CROP, OF THE THREE PREVIOUS CAMPAIGNS.

(From Licht's Monthly Circular.)

	1888-89. Tons.	1887-88. Tons.	1886-87. Tons.	1885-86. Tons.
France	500,000	392,824	485,739	298,407
German Empire	1,025,000	942,441	1,012,968	838,131
Austro-Hungary	575,000	408,616	523,059	377,032
Russia and Poland	475,000	430,000	479,582	537,820
Belgium	137,500	135,000	132,570	88,421
Holland	45,000	39,280	36,098	28,818
Other Countries	67,500	56,050	56,050	55,000
Total	2,825,000	2,404,211	2,726,066	2,223,629

The only alteration which Mr. Licht makes this month, for 1888-1889, as compared with the two previous months, is in Austria, the estimated crop of which he now puts down at 575,000 tons in the place of 600,000 tons.

At page 673 we give Mr. Joseph Görz's estimate, which is less by 220,000 tons.

STATE AND PROSPECTS OF THE ENGLISH SUGAR MARKET.

There has been a good business done during the past month in both raw and refined sugars, and prices have been well maintained; in some kinds a slight advance has been obtained.

Stocks, in all hands, are smaller than has been the case for many years, both in this country and in the United States. With a large beet crop before us, however, which, according to Mr. Licht will be 420,000 tons, and according to Mr. Görz 270,000 tons, larger than 1887-1888, it is scarcely likely that we shall see a repetition of last December, when prices went up from 1s. 6d. to 2s. per cwt.

German beet, 88%, is now 13s. 4½d. per cwt., and for January—March, 13s. 6d.

The accounts from the cane-growing countries are more favourable, and the crops, as a whole, it is now thought may equal those of the past year.

The imports of foreign refined for October were 25,201 tons, against 21,468 tons in 1887, and for the 10 months 243,945 tons, against 275,092 tons in 1887.

The deliveries of sugar into the United Kingdom (four principal ports) to the 21st November, as compared with the same period in 1887, show an increase of 42,384 tons, and the imports an increase of 34,770 tons.

The stocks of sugar in the United Kingdom on the 24th November were 148,375, against 163,949 tons in 1887, a decrease of 15,574 tons.

Present quotations for the standard qualities, as under, are :—

FLOATING.			Last Month.
Porto Rico, fair to good Refining	13/6 to 14/-	against	13/6 to 14/-.
Cuba Centrifugals, 96°/₀ polarization	16/-	,,	16/3
Cuba Muscovados, fair to good Refining..	13/6 to 14/-	,,	13/9 to 14/-.
Java, No. 15 to 16, good to strong	16/6 to 16/9	,,	16/6 to 16/9.
LANDED.			Last Month.
Madras Cane Jaggery..	9/6 to 9/-	against	9/- to 9/6.
Manila Cebu and Ilo Ilo	9/- to 9/6	,,	9/- to 10/-.
Paris Loaves, f.o.b.	18/- to 18/6	against	17/6 to 18/-.
Titlers	19/6	,,	19/3
Tate's Cubes..	21/6	,,	21/-
Austrian-German Beetroot, 88 °/₀ f.o.b. ..	13/4½	,,	13/-